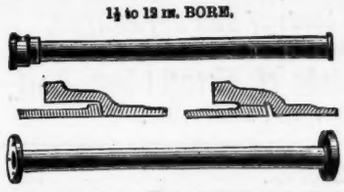
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1887.] LONDON, JULY 11, 1899. [51ST YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



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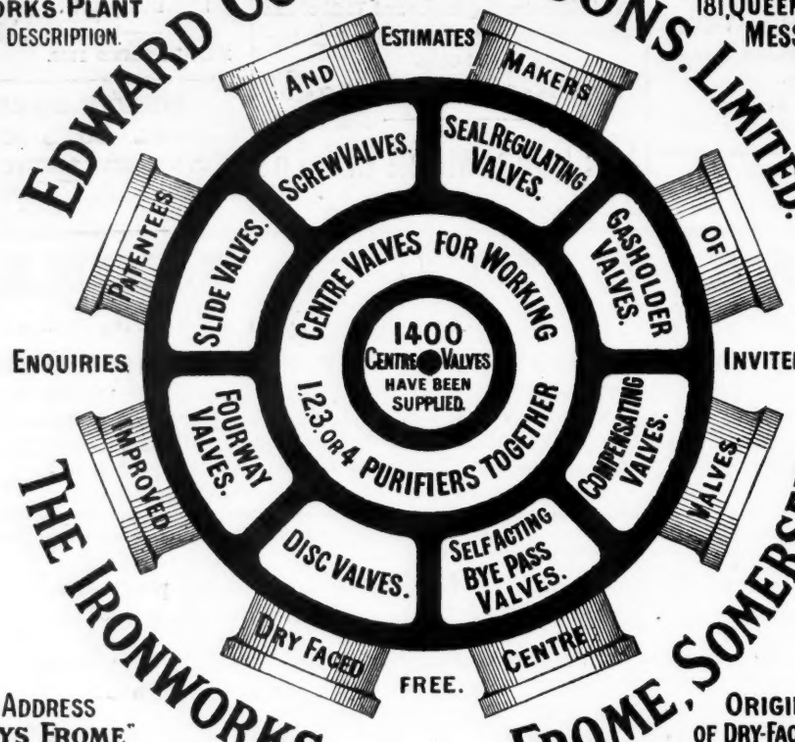

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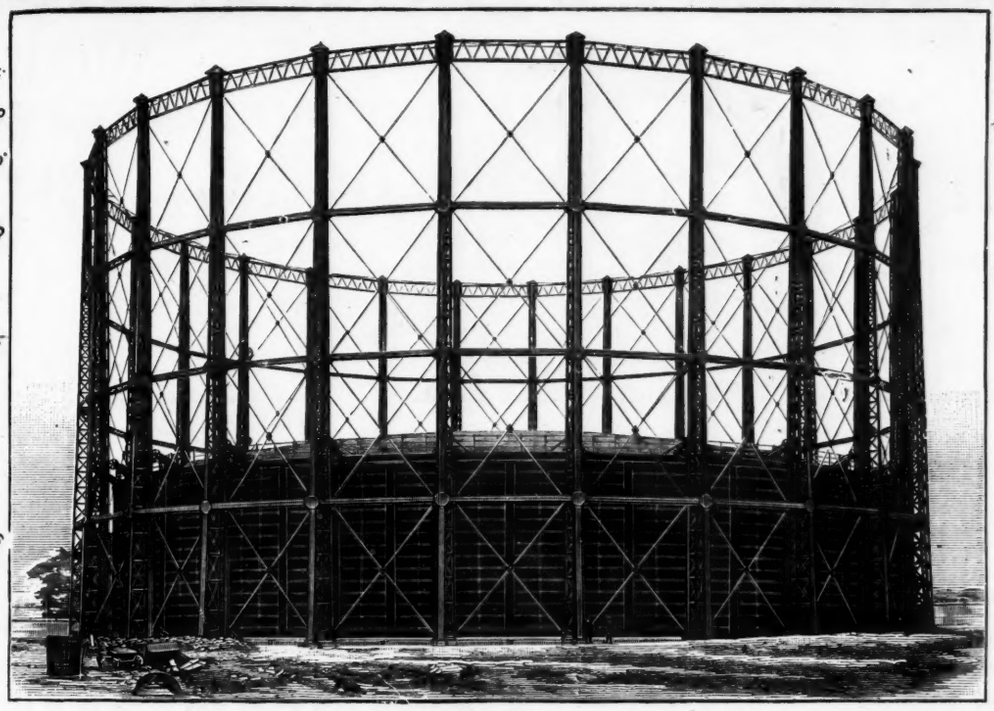

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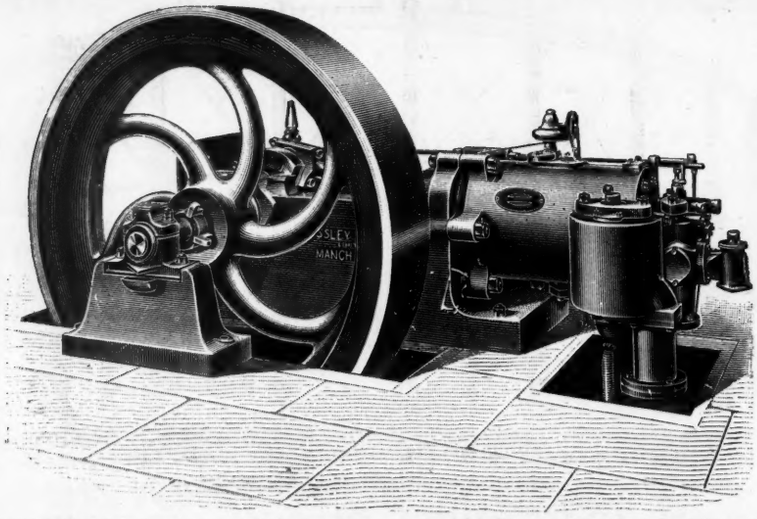

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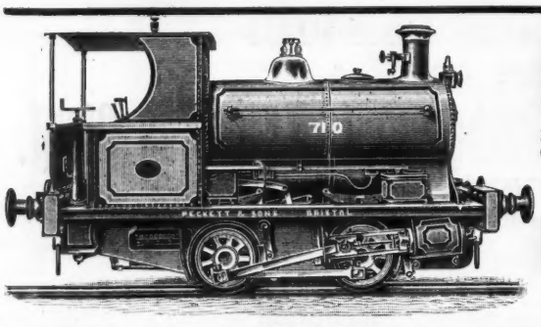

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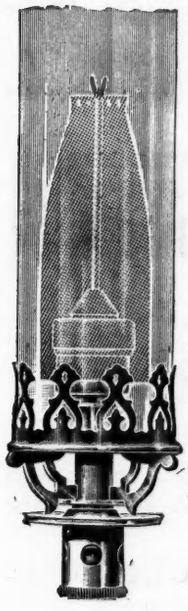

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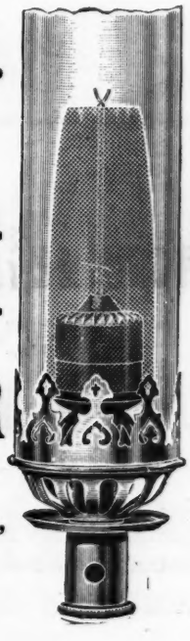

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A CHEAP FORM OF THE "C" BURNER.
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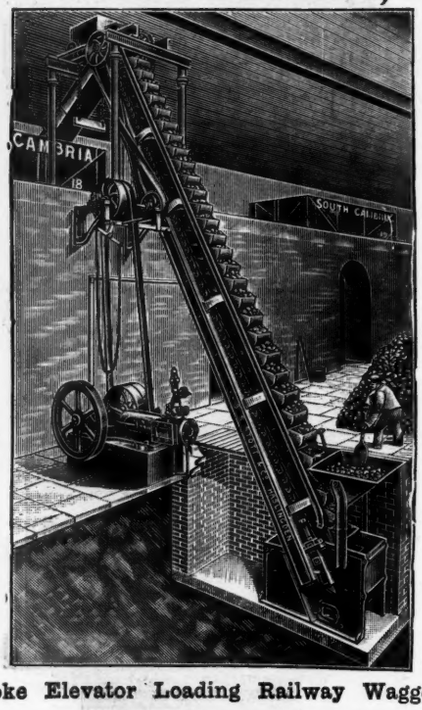

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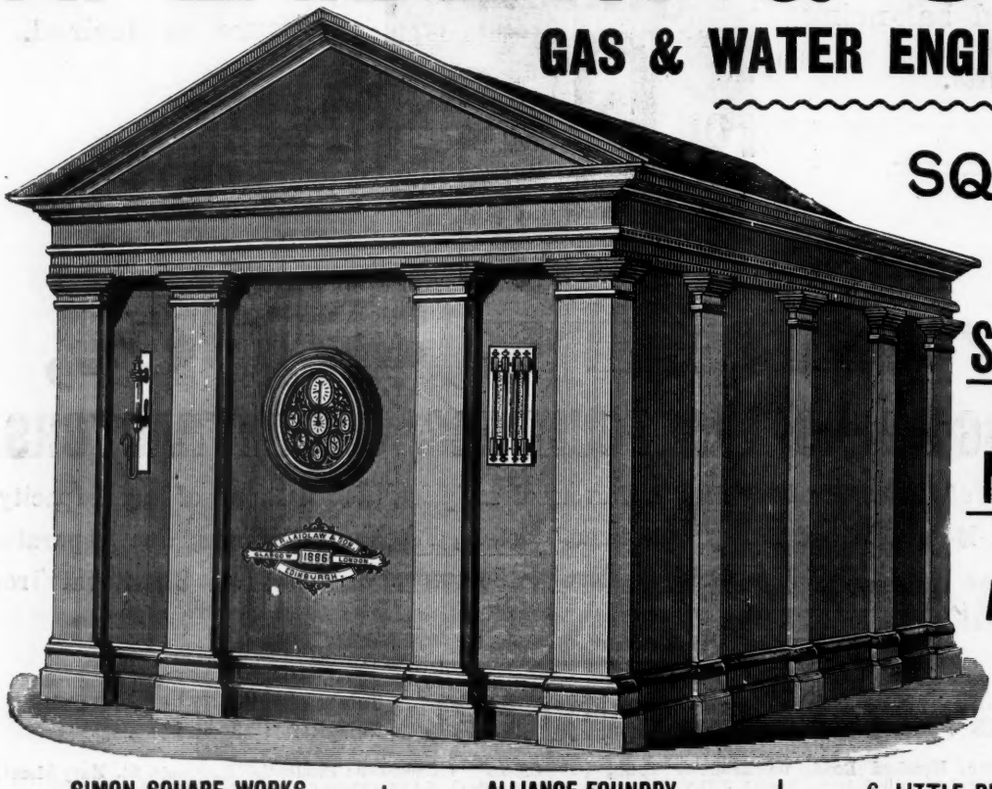

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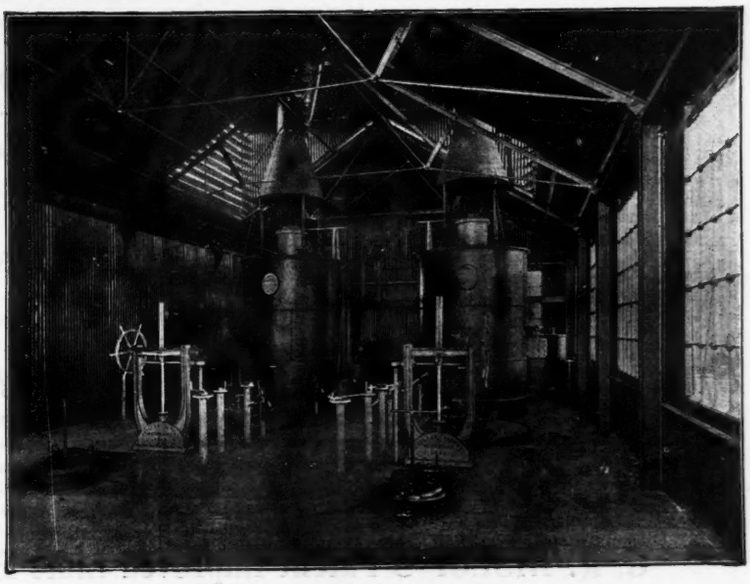
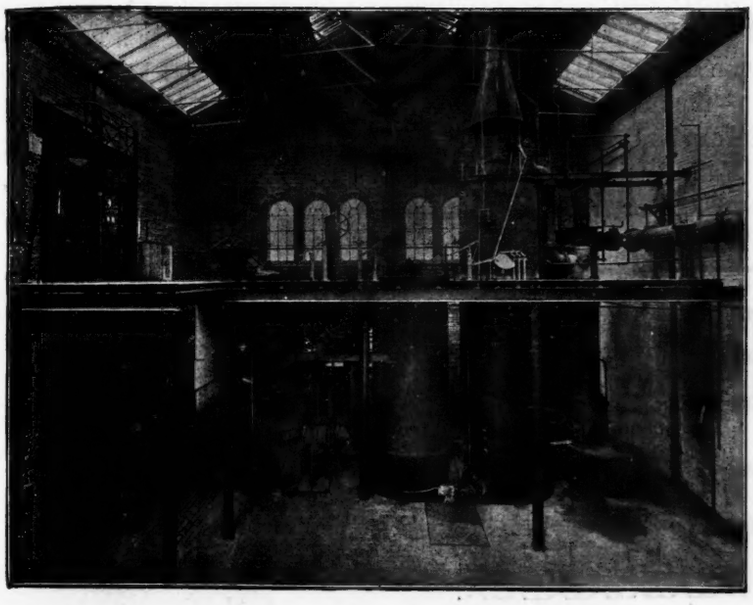


Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone.

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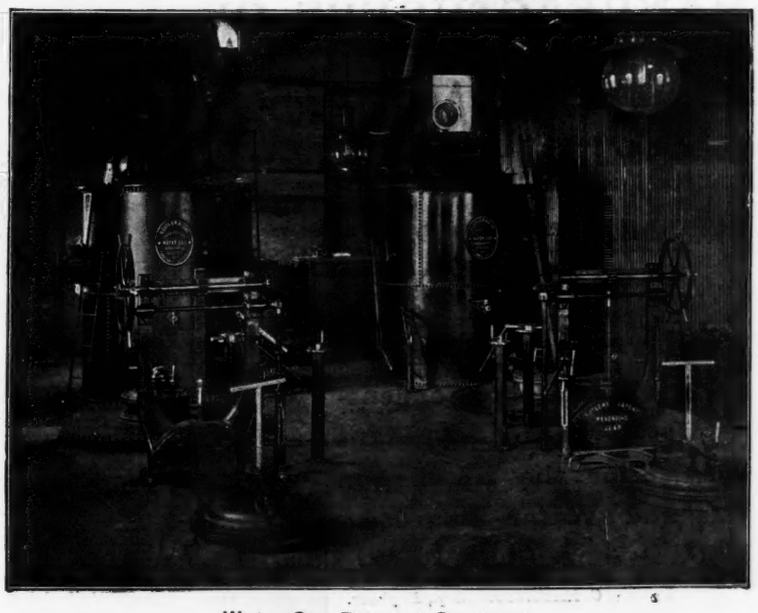

Water-Gas Plant at Southend.

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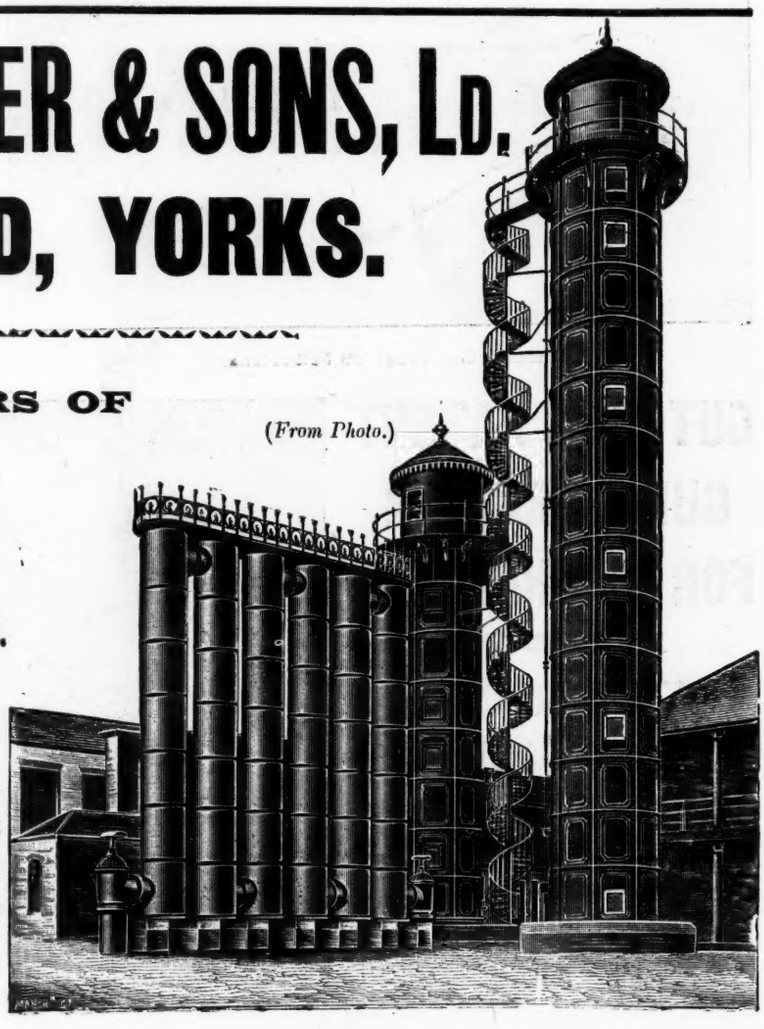
GAS PLANT

OF EVERY DESCRIPTION.

(*From Photo.*)



View illustrating Condensing and Scrubbing Plant erected for the Accrington Gas and Water Board by R. D. & Sons, Ltd.

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Ledbury	Shifnal
Leek	Shipston-on-Stour
Leven, N.B.	Sidmouth
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Loughborough	Southam
Lymington	Southend
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Newnham	Swinton
North Middlesex	Tetbury
Odiham	Tokio
Ogmore	Uppingham
Outlane	Uttoxeter
Parsonstown	Ventnor
Pembroke	Warwick
Penmaenmawr	Wexford
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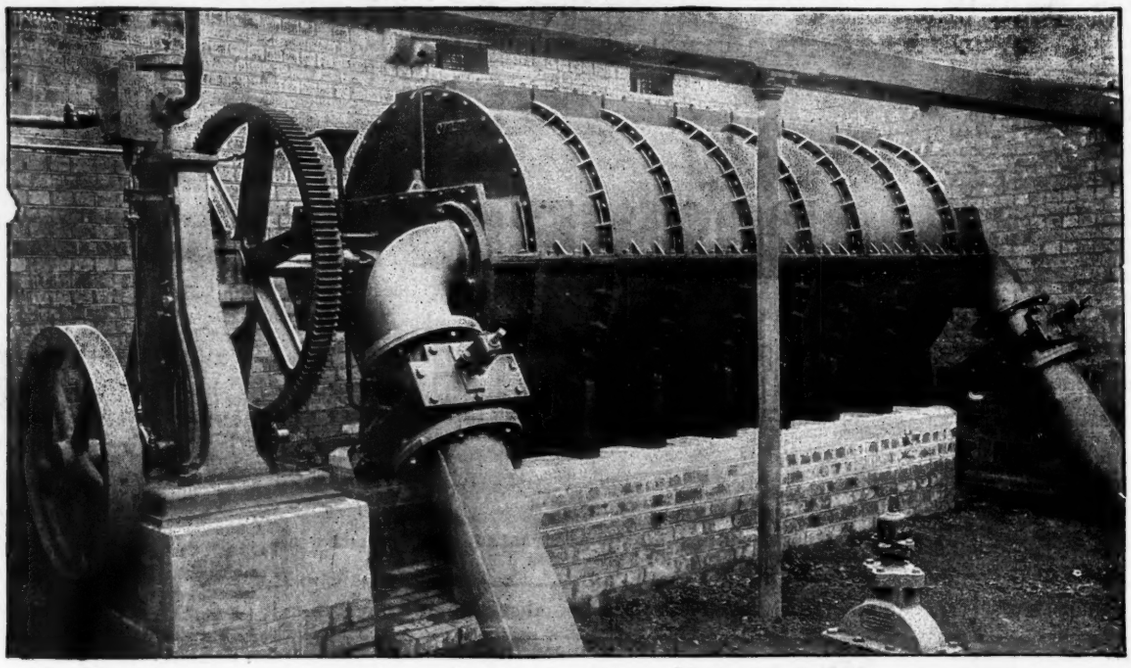

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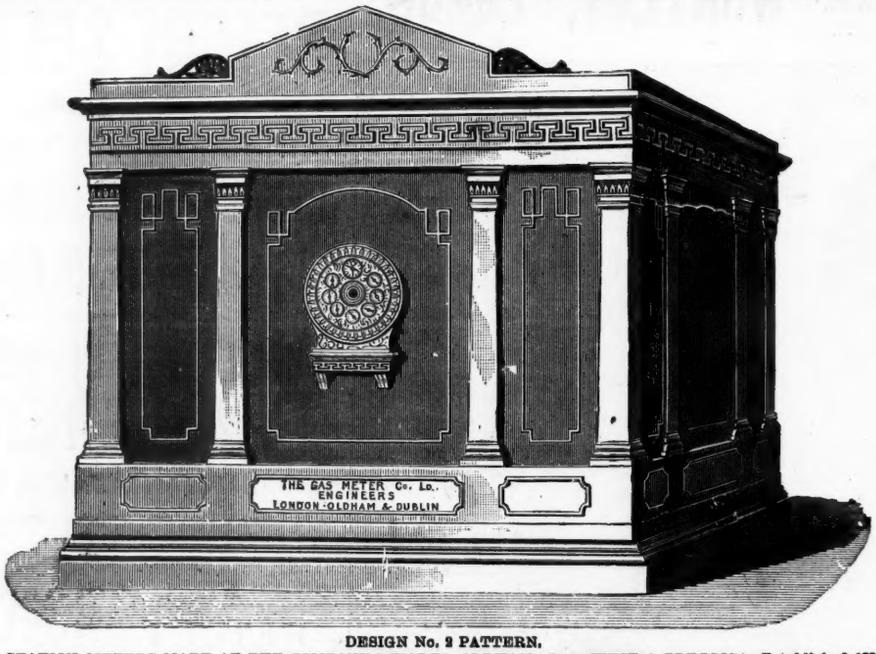

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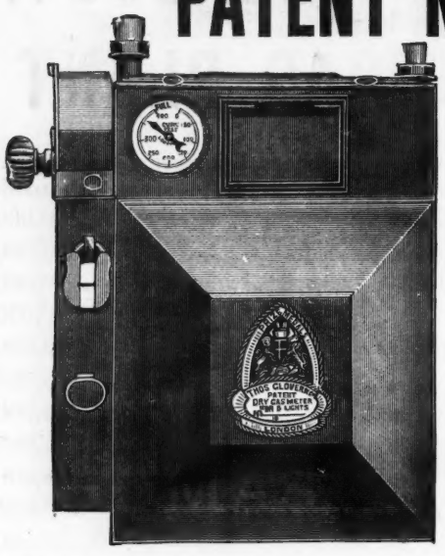

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EDITORIAL NOTES.

Conclusion of the Inquiry into the Price of Gas in London.

AT length the painful labours of the Powers of Charge Committee have come to an end, so far as the taking of evidence is concerned; and the Committee will only meet again to consider their report. The members will most probably feel immensely relieved, as regards the question of time, by the action of the House of Lords in dismissing The Gaslight and Coke Company's Bill. Nothing can be done this session; wherefore Parliament need be in no great hurry to come to a decision as to how the Company had better be dealt with. For it would be idle to pretend there is any other question before the Committee. Parliament is a practical body; and in connection with this inquiry the only point of practical interest lies in the difference of the prices of gas in various Metropolitan districts. The administration of The Gaslight and Coke Company actually take £800,000 a year more from the consumers of their gas north of the Thames than they would have been enabled to do if they had been compelled to charge throughout the same price as the South Metropolitan Company. We have reported the proceedings of the Committee at enormous length, and have refrained from attempting to weigh or to discuss the evidence. The honours of space fall naturally to Mr. John W. Field, who has had to bear the brunt of defending the Horseferry Road administration from the charge of incompetence. As was to have been expected, Mr. Field has proved "game" to the very end. Readers of our report must judge for themselves how he has stood his ground. A good deal of controversy has centred in the question whether the southern portion of the old London Company's district should be handed over to the South Metropolitan Company; but this, although an important point, is not of any real public interest. Nothing that the Committee would be likely to recommend in this regard could be more to the advantage of the public concerned than the existing arrangement, which is a monument of Board of Trade distrust of The Gaslight and Coke Company. The concluding portion of Mr. Field's evidence shows that he was pushed hard at all points. Rarely has a witness before a Parliamentary Committee had a harder time of it; for it must be conceded to be severe on any man to be called upon to defend himself single-handed from the imputation of incapacity in his responsible office. The greatest curiosity will naturally be felt throughout the whole gas industry of the United Kingdom respecting the finding of the Committee. Will the administration of the Company be absolved from responsibility for the existing discrepancy in London gas prices? This is for the Committee to decide, in the first place. But what will happen then is another consideration.

Gas Supply to be Judged on the Basis of Competition.

THE proceedings in regard to the admission of a competing supply of electricity into the City of London are of the deepest interest for all administrators of statutory supply undertakings. In the Electric Lighting Act, it is actually specified that competition in supply may exist compatibly with statutory privileges. There can be no question that, although the fact is not specified, every gas and water company in the United Kingdom is subject to the same liability. This is an aspect of their position which the responsible heads of gas and water companies have not always perceived. Apart altogether from the vexatious question of the monopoly rights of municipalities, there is no monopoly in the statutory privileges of any British gas or water company. It has always been recognized that Parliament will not allow a local authority to embark upon the supply of gas, water, or electricity in competition with a private undertaking actually and efficiently engaged in the same business in the locality, because it is not fair that privately subscribed capital should be at the mercy of capital raised on the security of the public rates. The question whether a gas company does or does not possess a Private Act of Parliament is of no moment at all in this connection. There is a good deal of popular misunderstanding as to the value of an Act of Parliament, as a protection for a gas undertaking. It will have been observed that when a gas undertaking has been transferred of recent years from a company to a local authority, the difference of valuation between the property of statutory and non-statutory companies has tended to disappear. It was Mr. Newbigging, we believe, who first roundly declared that he could see no essential difference between the value of a statutory and a non-statutory gas

undertaking; and the observation s a just one. An Act of Parliament ought not to have any specific monetary value for a gas company. It is often specified in Gas Acts that they shall not be taken to enhance the value of the undertakings to which they apply; and this should certainly be the general rule.

Whatever else the possession of an Act of Parliament may do for a gas company, therefore, it certainly is not required to protect the company from competition by the local authority. This protection is a question of equity, and can be invoked without fear of failure against any marauding local authority who should be so ill advised as to contemplate an act of piracy. For protection against competition by other adventurers, an Act of Parliament is at best only an indirect means of defence. The first, and main, line of defence consists in the efficient use of the natural opportunities of position. If the administrators of a gas undertaking can defy any hypothetical competitor to do better than themselves, they are justifying the legislative protection which they may enjoy. If, on the other hand, they rely upon a legislative settlement, or a contract with the local authority, as absolving them from the obligation to carry on their business in an efficient manner, there is really no statutory insurance against their having a rude awakening.

There is no occasion to point the moral of these reflections, the bearings of which are pretty obvious. The sliding-scale in gas legislation was devised as a means of inducing gas companies to conduct their affairs with ordinary commercial ability. Not having the fear of the Bankruptcy Court before their eyes, gas directors and their chief officials are liable to fall into the delusion that they have nothing else to fear. They make laws of conduct for themselves, and affect to despise the criticism that would bring them at least into line with their neighbours and compeers. The truth of the matter is that a statutory gas company must be subjected to the test of comparison, as the simplest and least injurious phase of competition. Parliament does not favour competitive gas supply, not out of regard for the gas companies in possession, but for the sake of the public. Gas directors everywhere should bear in mind that it is only by an accident that they are not compelled to struggle for business just like other traders; and the warning is not unneeded. There is a type of gas director whose one idea of making the dividend is to make the price of gas to suit. This is simple, and saves a deal of worry. Put in the price per thousand cubic feet, and out comes the dividend. It is quite automatic; but it is not business, nor is it that for which directors are paid. The unpaid gas committees of corporations can do no worse.

The Despotism of the Engineer.

THE grievances regarding the form of the London County Council's engineering contracts, which have been ventilated on several occasions by certain leading firms, were recently considered by the General Purposes Committee of this body. Without going here into all matters of complaint, notice may be taken of one particular point—the arbitration clauses—as the principle at issue affects the general practice of engineers. To summarize this complaint, it was objected that, in the County Council contracts, the officers of the Council are made the sole arbiters of any dispute which may arise as to the carrying out of the work. The objection to this was that such an arrangement is manifestly unfair, and is probably illegal—unfair, in that the setting up of one party to a contract as sole umpire as to its meaning deprives the other party of his civil rights under it altogether; and illegal, in that a reference of all matters in dispute to a single arbitrator goes beyond the utmost limits of the Arbitration Act of 1889, and amounts to an ousting of the jurisdiction of the Courts of Justice themselves. There is something in this complaint; but it is unquestionably true that, in regard to engineering contracts, the engineer is usually—almost invariably—endowed with full discretion to decide all matters of dispute. It looks hard, on the face of it, that one party to a contract should have all the say as to whether the terms of the contract are being observed; but in practice the privilege means no more than that the purchaser of an article should have the right to satisfy himself before parting with his money. Consequently, the London County Council had no difficulty in discovering that their practice in this regard conforms to that of most public authorities, and does not require altering. It would never answer for the engineer of a work of construction to submit to outside interference with his absolute discretion. Contractors would not benefit in the long run by emancipation from the unfettered governance of the one man whose chief interest is to get a good job done for his clients' money. There is only too much room for litigation, as it is, in regard to the incidences of contracting work; and it cannot be to the advantage of anybody but the lawyers to increase it.

Labour Troubles in Denmark.

THE intelligence that Denmark has for some time past been labouring in the throes of an industrial trouble of the first magnitude—realizing very nearly the agitators' dream of a "Universal Strike"—is certain to interest observers of the ways of the working man the world over. The economical conditions of the little kingdom between the Baltic and the North Sea have of late years been recognized as exceptional. It came to be understood that there were no poor in Denmark, and none noticeably rich. Everybody was supposed to possess the means of living in modest comfort; and if there were exceptions, the explanation was a matter of police. Right in the midst of this presumption that the state of Denmark was particularly healthy, comes the news of a general lock-out of all the men in the building, engineering, and iron trades, and all the trades connected with these, embracing about the half of the industrial population of the country. With the exception of the agricultural and domestic workers, it appears that the whole of the wage-earning inhabitants of Denmark are engaged in trying out with their employers the old question of who is master; and in view of the high degree of organization to which both sides have been brought, the dispute throws a strong light upon what might have happened in England any time since 1889, if the power of the Socialist Labour organizers had been equal to their will. In Denmark the organizers of labour found their task comparatively easy. Owing to the smallness of the country, and to the concentration of the greater part of the industrial population in Copenhagen, the formation of Trade Unions was a very simple matter indeed; and all the workpeople there were gathered in without any awkwardness such as keeps the industrial Tyne so distinct from the Thames. Moreover, the Danish Trade Unions were easily federated in a Central Association, which was far more powerful and effective than anything of the kind elsewhere. So far, good; but the labour organizations of Denmark, strong as they were for their own proper office, could no more keep clear of the political element than similar associations in England and America. The Labour party was thus also the Social Democratic Party in the State, but without neglecting its industrial ideals. Indeed, the Danish Trade Unions seem to have pushed co-operation to an extent undreamt of in the North of England.

Unfortunately, all this apparent economical success was attained at the jeopardy of the same kind of industrial hazard with which we are so painfully familiar at home. The Confederations, on the one hand of the workpeople, and on the other of the employers, constituted two forces in the field arrayed in distinct and opposite camps. That is the inevitable concomitant of the most perfect industrial organization. Sooner or later, the two organizations are sure to get embroiled over some question of principle; and then "the fat is in the fire." In Denmark, the joiners began it. The workmen of a few Jutland villages went out on strike; and when the respective Central Societies agreed upon terms which the strikers ought to accept, the latter refused to do anything of the kind. Thereupon the Employers' Federation declared a general lock-out of joiners, which had the effect of bringing the Jutlanders to reason. The weakness of the link between the sectional and local and the central labour organizations was revealed, however; and the employers refused to patch up a truce until arrangements had been made to ensure a better correspondence between the head and the members of the men's Associations. The employers formulated certain demands, which the men's leaders denounced as an attack upon the principles of Trade Unionism—how familiar this all sounds!—and battle was offered and taken on these grounds. There was no nonsense about it. The employers locked out the whole of the Union men, in order to see who was master. According to the Copenhagen Correspondent of "The Times," the local opinion generally is on the side of the workmen; the action of the Employers' Federation in forcing on a trial of strength with the Trade Unions being regarded as arbitrary and unjustifiable. Here we have the traditional criticism of standing armies. In other words, the sight of means to do ill deeds is supposed once more to have precipitated the doing of them.

In the case in point, support is given to the judgment against the employers by the decision of the standing Trades Court on complaints lodged by the various Trade Unions. It is the universal, and reasonable, practice to insert in all agreements between organizations of employers and employed, stipulations against any future striking or locking-out before negotiation. A general strike or lock-out obviously contravenes this condition, which existed in the Danish industrial settlement. The Court unanimously decided that the lock-out was a violation of right. Such a verdict is bound to have its effect sooner or later. If the members of the Institution of Gas Engineers go to Copenhagen in the autumn, they might profit by the opportunity to look into this subject of the national organization of labour and its results.

The Government Bill to Amend the Law of Joint-Stock Companies.

THE amendment of the law of Joint-Stock Companies, with a view to the prevention of the worst of the abuses that have gathered round this notable expedient for the furthering of commercial enterprise, is understood to be one of the reforms which the present Government are pledged to carry through Parliament. A Bill was tabled with this object so long ago as May, 1896, with the intention of inviting constructive criticism. The object sought has been attained, with a vengeance; for during the last three years the subject of the Bill has been very thoroughly discussed in and out of Parliament. Lawyers have worried it; politicians of all complexions and grades have played with it; and bishops have expatiated upon it. Finally, the termination of the first, or acute, stage of debate on the matter has been signalized by the fact of the Select Committee of the House of Lords having reported the Bill to the House, as amended. As not infrequently happens in similar affairs, the amount of reform found to be both necessary and practicable does not appear to be much, when weighed in the balance against the perfervid clamour of the enthusiast in the cause. 'Tis a bad world; and the pity is that the way to make it a better one should be so long and painful. Take the glaring instance of the folly and wickedness of War. This is a judgment upon which all good and respectable people are in complete agreement. The case against War in the abstract was stated as convincingly as it is ever likely to be in this world by Carlyle, in "Sartor Resartus." Students of the immortal work know the passage. Yet a good many men have killed one another on Fields of Glory since the book was written; and the Peace Conference at the Hague does not seem to be much more than advertisement. Company swindles are perhaps best regarded as variants of the immemorial process by which rogues have prospered at the expense of honest men. This is, of course, no reason why the way of company swindlers should be made easy by defects of law; but it is a very good reason for doubting the competency of legislative remedies for the class of deceptions in question. Joint-stock company swindling is as likely to live as the "confidence "trick," of which it is in many respects an elaboration. But it can be made less easy of performance; and the amended Government Bill bids fair to put a check upon the worst evils that have eaten into the actual system. That the Bill, as a whole, is not an heroic or a revolutionary measure, is a proof of the common sense and experience of those who had a hand in drafting and improving it.

Men of the world, and of business, know very well that high-sounding general enactments against fraud and false pretence in trade are not worth anything like so much as an apparently minor restriction which strikes at an actual abuse. People who want good, working laws are turning their attention more and more to legislation upon specific points. We have the Ten Commandments and the Common Law, and very good they are; but they do not always touch the spot. This kind of difficulty has been borne well in mind by the framers of the Government Bill. A good example of the practical lines upon which the Bill is drawn is furnished by a provision which makes the applicant for registration of the Memorandum and Articles of Agreement of a company responsible for the list of directors. If the name of any person is given in as consenting to serve in this capacity who has not, as a matter of fact, so consented, the applicant is to be liable to a fine of £50. This is the right sort of legislation—not leaving it doubtful as to what is permissible, or who is to be held responsible if anything is wrongly stated. One of the commonest of frauds in connection with really fraudulent company promotion is the barefaced use of names of persons for various objects without warrant or permission. It is a kind of bait which is only too effective in catching the public. The ordinary man does not, and cannot be expected to, know all about the merits of every venture that is offered to him in the usual way; but when a name is mentioned in a particular sense in connection with the scheme, if he knows the name he is naturally influenced by it. Every improper and unauthorized use of a name in such a connection should be smartly punished. The Bill under notice would be entitled to respect, if only for the attention paid to this point.

WATER AND SANITARY AFFAIRS.

IN dealing last week with the rejection of the East London Water Company's Bill by a Committee of the House of Lords, after it had successfully passed the Commons, our remarks were confined mainly to a review of the circumstances which led to its introduction, and of the arguments and the evidence adduced in its progress through the two Houses. Notwithstanding all the forensic and engineering ability displayed in conducting the case, their Lordships—doubtless for sufficient reason, from their point of view—did not consider that the promoters had justified the statements in the preamble. Of course, the Company do not, as they pointed out in their letter to the Local Government Board, given in the "JOURNAL" last week, question for a moment the decision of the Committee. It has been given, and it cannot be appealed against. At the same time it is quite permissible to briefly consider its effect. By the refusal of the Committee to grant the necessary powers and money to complete the scheme of reservoir construction which had the approval of Lord Balfour's Commission, the Company have been prevented from providing means for ensuring a constant supply of water in their district; and in the letter above alluded to they have been careful to put upon the right shoulders the responsibility for any inconvenience the consumers may suffer in the future. That responsibility rests mainly with the London County Council, although the Parliamentary Committee of that body, in the report which is on the *agenda* of business for to-day's meeting of the Council, endeavour to place it upon the Company. The Committee were, no doubt, under the impression that the works proposed were not urgent. Let it be granted that they were not immediately required. But surely the provision of adequate storage is always urgent. It is true that, under the Intercommunication Act, the Company will be able to obtain help in time of pressing need; but their position would have been rendered more secure if they had been allowed to proceed with the two additional reservoirs which they proposed. For even assuming that the County Council are eventually successful in obtaining parliamentary sanction for carrying out their Welsh scheme, provision must be made, as we have pointed out over and over again, for the supply of the population during the period of twelve or fourteen years—possibly longer—which must necessarily elapse before any Welsh water is available. In the meantime, there will be quantities of water, at our very doors, running to waste—"wicked waste," Sir Frederick Bramwell says—in the Lea Valley, which might have been utilized to supply the needs of a growing and to a large extent working-class population. If the Company's district were all covered, there would have been less necessity for the extensions proposed. The Directors and Engineers would have been able to gauge, so to speak, the demands upon their resources for the next few years. But this is not so. Houses are being "run up," as the "Builder" puts it, by the hundred in the Company's area; and, with a greater aggregation of people, an ample supply of water will be increasingly imperative. Our contemporary is confessedly "no sympathizer with "any London Water Company;" but nevertheless it has the justice to recognize this fact—that, "unless Parliament "immediately ordains a public body to supply water, those "whose duty it is at present to do so must be permitted to "carry on their work." This, it seems to us, is precisely what the London County Council strive to prevent—with the ratepayers' money. The position of things thus created is not unjustly characterized as "one of the gravest scandals "of the century."

We are again having a spell of hot weather, and yet no intimation, so far as we are aware, has been given by any London Water Company—not even by the East London—that the consumers will be well advised to use the water sparingly, in view of a possible curtailment of the supply.

In point of fact, the Directors of that Company are going to increase theirs by restoring the constant service to the houses from which it had been cut off, as soon as the fittings have been repaired. But what do we find in cities which are frequently pointed to as examples of the advantages of municipalized water supply? We referred quite recently to the warning note sounded in Birmingham. Now it has been echoed in Manchester. The Corporation and the city at large are naturally proud of their unquestionably fine water-works; and with a feeling of justifiable elation at the thought of the security from scarcity of water which the completion of the Thirlmere scheme had brought, the Chairman of the Water Committee—Sir John Harwood—was led to use language which probably in a calmer moment he would have hesitated to employ. He gave the citizens to understand that, so ample was the supply of water at their command, that they could "draw it from morning till night." Of course, he did not mean that his words should be taken literally; but, unfortunately, this appears to have been done. Before the introduction of the Thirlmere water in 1894, the citizens of Manchester used 25 million gallons a day. Last year the quantity had risen to 31 millions; and now the daily average is 36 millions, or rather less than the amount sent out daily by the New River Company in May. We agree with Sir John Harwood that, making all due allowance for growth of population, this increase is enormous; and we also share his opinion that "wilful waste" is the cause of it. The dire consequences of such waste are forcibly impressed upon most people in early years through the medium of the copy-book; but probably, in their anxiety to escape the criticism of the writing master, they pay less regard to the metaphysical value of the proverb than to the necessity for presenting it in their neatest caligraphy. We are dealing now, however, with hard facts, not metaphysics. Sir John Harwood last Wednesday, in open Council, warned the public of Manchester that if they went on using water as they had been doing—that was to say, wastefully and extravagantly—their conduct would bring its own reward by giving rise to what he mildly described as a very disagreeable state of things. He acknowledged that the augmented consumption was to some extent, but not wholly, due to the adoption of the water-carriage system. There is no need for immediate alarm, as there is an available supply for 130 days; but Thirlmere is down nearly 2 feet, and there are signs of a continuance of dry weather. We do not notice that Sir John Harwood has been roundly abused in the columns of the Manchester papers for his timely and highly necessary remonstrance; but we leave our readers to judge, by what has happened in the past, as to the effect of such a warning, if given the form of a circular emanating from the offices of the East London Water Company.

When considering the position of Birmingham a few weeks since, we took the opportunity of glancing at the condition of the water supply of Paris, where, after about four days of hot weather, the service of spring water had been curtailed, and the prospect of the Seine water—contemptuously spoken of as a "solution of sewage"—being turned on was uncomfortably near. Why, it may be reasonably asked, with more than a dozen reservoirs inside the fortifications of Paris, should they be "always empty on the least "emergency," as they are stated to be? The answer is furnished by a French technical publication, in which it is boldly asserted that, as a matter of fact, these receptacles cannot be filled to their fullest capacity owing to their structural defects. A few months ago, the official of the Ponts et Chaussées who was responsible for the water supply of Paris—M. Belgrand's successor—died; and the vacancy thus caused allowed of a rearrangement of the staff. It was thereupon decided to introduce, on the same footing as the technical members, an administrative staff who would be rather less independent of the Municipal Council than civil engineers generally are. In other words, they would be directly answerable to the Council. And what is the result? If we may accept the statements of the publication referred to, the water service of Paris is in a less satisfactory condition to-day than it has ever been. This is the effect of the perpetuation of the bureaucratic idea, which is so essentially French. Administrators come and go, but administrations change not—the system remains; and the poor Parisian is worse off than before. With the view of augmenting the supply, the sources of the Avre have lately been tapped at a cost of about 30 million francs, and the water obtained is said to be polluted; while great expense is incurred in bringing the waters of the Lunain and the Loing to the city, where there is no suitable place in which to store them. This may be good bureaucratic engineering, but it would scarcely do in London; for, although the Directors of the London Water Companies are accused, by certain writers in the Press, of having regard only to the making of their dividends, they have taken good care, as an eminent geologist pointed out only a few weeks ago, when speaking on the London Water Question, to have the best engineers they could get for making the works, and where these gentlemen have been allowed a free hand, those works will, we venture to think, stand comparison with the productions of their academic brethren across the Channel. While on the subject of the water supply of Paris, it is pleasant to think that the stigma cast upon the Seine water is likely soon to be removed; for last Saturday the vast sewage scheme which has been in progress for nearly thirty years, and has cost upwards of £4,000,000, was brought to a successful completion, and thus a serious source of pollution will be kept from the river.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 129.)

THE Stock Exchange had another short innings of five days last week; Saturday again being a closed day. Business, too, was restricted to very limited volume. Apart from the counter attractions of Henley and other scenes of sport, operators were checked by the strong feeling of caution which continues to rule them until the unravelling of foreign difficulties is clearer. But in spite of all this, things were distinctly better, showing that, if only the political atmosphere were clearer, prices might have a smart rise. Consols again furnish a conspicuous exception, for they fell from 108 on Monday to 107⅞ on Friday. This was to a great extent brought about by the course of the Money Market, which took everybody by surprise. Instead of rates easing off considerably at the turn of the half year as usual, they have gone the other way. The normal fall was probably over-discounted; and a sharp reaction set in against those who were out. In the Gas Market, business would have been quiet enough, but for dealings in Gaslight issues. The full effect of the reverse sustained by the Company in the Lords' Committee on the previous Friday was not felt at first; the opening prices being 108 and 108½. But then came a sharp drop to 105. The next day it opened at 104. But this was the worst price of the week; and a slight rally later on brought it to 106 as the closing mark. The maximum was at the same time knocked down to 96. But there it stopped; and nothing more was done in it. The preference and debenture were not affected. Only two or three bargains were marked in South Metropolitan; but the tendency appeared to be slightly more favourable. Commercials were quiet and unchanged. The Suburban and Provincial undertakings were very little dealt in, and furnished no sign of any pronounced tendency. In the Continental group, Imperial was better, and gained a point; but Union fell back. The preference, too, was put back on Monday, but was restored the next day. Among the Companies in distant parts, San Paulo advanced, and Bombay receded. There was moderate business done in the Water Companies at the old figures; and the former week's quotations were left undisturbed.

The daily operations were: Business in Gas was rather quiet on Monday, mostly in Gaslight ordinary, which fell 3. Continental Union ordinary also fell 3, and the preference 2. On Tuesday the business was almost entirely in Gaslight issues. The ordinary lost 1, and the maximum 3½. Continental Union preference recovered 2; and San Paulo rose ½. Wednesday's transactions were in Gaslight ordinary, which was a little steadier. Bombay moved back ½. Thursday also was calmer, and Imperial rose 1. The better feeling was maintained on Friday; and Gaslight ordinary recovered 1.

THE LONDON COUNTY COUNCIL AND THE FLASH-POINT OF PETROLEUM.

THE parliamentary session is waning; and still the Government Petroleum Bill delays its coming. Mr. Reckitt betrayed the other day a pardonable curiosity concerning the state of a measure which was promised in place of his own artless Bill; but the Leader of the House had forgotten all about it. This does not look promising for the prospect of immediate legislation on the subject. Naturally, those people who are so anxious to put the whole petroleum trade under restraint take umbrage at the dilatoriness of the Home Office in framing the expected Bill; but their eagerness for more regulation of the mineral oil trade in the imagined interest of public safety—some people are unkind enough to say, really in the interest of the Scotch and

Russian oil refiners and importers—is unintelligible in face of the common knowledge that the Government do not favour the raising of the flash-point of burning oil. We are well content that matters are left alone so far; because any fresh legislation on the subject of mineral oil will certainly interfere more or less with the freedom of all the great industries (including gas manufacture), which are interested in the maintenance of free trade in petroleum oils. Mineral oils are cheaper in this country than they are anywhere else, outside the actual oil regions; and it is little short of amazing that so many worthy amateurs of the subject should be so infatuated with the fancy for a high flash-point for lamp oil, that they are quite ready to sacrifice everything for this questionable safeguard. When the ordinary Briton, with his innate scorn for the poor, benighted foreigner, marvels at the Dreyfus affair and its effect in dividing the French nation, it might chasten him to be reminded that the British public likewise sometimes gets carried away by fads and fancies. To judge from some of the extravagant press statements respecting the flash-point question, there is an amount of prejudice and temper engaged on one side of this controversy which one would not have looked for in Englishmen, especially when the issue turns upon a purely technical point. Some of these flash-point partisans are as rabid as the half-forgotten Tichbornites were in their day, and about as convincing.

Meanwhile, the strongest advocates of raising the flash-point of burning oil—the Public Control Committee of the London County Council—have reported on the petroleum lamp accidents which occurred in London during the year ended March 31 last. This report was editorially noticed in the "JOURNAL" for the 27th ult. We then remarked that the figures relating to lamp accidents were not alarming; that the evidence would require to be carefully examined; and that the conclusion of the report confirming the appeal for a higher flash-point was preconceived. We reserved further examination of the report, in the belief that the particulars which it summarized would be available. Unfortunately, this is not the case. The report of the Committee is nothing more than ordinary statements printed in the *agenda* paper for the Council meeting of Tuesday, June 13, occupying about twenty lines of type. It is stated, as already chronicled, that during the year the Committee have had investigated the causes of 304 petroleum lamp accidents to which public attention was called. Twenty-eight of these were fatal. It was found that 39 of the accidents were caused by the explosion of the vapour in the reservoirs of the lamps, and 265 by the ignition of oil which, in the great majority of cases, "escaped through a fracture of the reservoirs." Upon this bare recital of what we are willing to take for facts, the Committee proceed to argue that: "As neither explosion nor sudden ignition usually takes place until the temperature of the oil has reached or passed its flashing point, we attach the greatest importance to the raising of the statutory test to a point higher than the temperature reached by oil in the reservoirs of lamps while burning. From a large number of experiments made by the chief officer of the Public Control Department and by others, it is clear that the temperature of 100° Fahr. is rarely reached by petroleum oil while being burnt in lamps; and we believe that if no oil below such a flash-point were used for illuminating purposes, the great bulk of the accidents which now occur would cease." The report goes on to acknowledge that if only well-made lamps of safe construction were used by the public, the number of accidents would be largely diminished; but it is also realized that it would be impossible for legislation to touch the immense number of lamps in nightly use in the United Kingdom (estimated at 10 millions), or to prevent lamps which might have been safe when new from becoming unsafe through accident or neglect. This pertinent reflection brings the Committee back to their previous thought, that the raising of the flash-point would be "an effective and simple way of obtaining security. It would benefit almost every class of the community and injure none. It would come into immediate operation, and would be lasting in its effects. The intimate knowledge of the subject given by careful investigation into the causes of lamp accidents in London during the past 10 years, convinces us that this method, and this only, will give adequate security to the public." That is all the report, a copy of which has been thoughtfully sent to the Home Secretary. With all the respect due to the Committee, we venture to submit that it is extremely unsatisfactory.

Where support is desired for a foregone conclusion, it cannot be too fully particularized and well founded. The view of the cause of lamp accidents and their remedy likely to be taken by the Committee was to have been anticipated. It may be supported by the evidence concerning the 304 accidents of the past year; but this does not appear in the report, which suppresses the facts. All that is to be said in this regard is that without knowing the details, one cannot accept the conclusion offered by the Committee. The conclusion may be a just one; but it is not proved. We should require a very clear and particular recapitulation of the circumstances of all the accidents before accepting the connection of cause and effect offered on their own authority by the Committee. This objection would hold good even if this body had not already placarded themselves as a high-flash party. Although the report in the present instance does not offer a single proof in support of the Committee's ancient prejudice, it does contain passages which are open to adverse criticism. Let us take the statement that "neither explosion nor sudden ignition usually takes place until the temperature of the oil has reached or passed its flashing point," which points to the moral that perfect safety would be secured by raising the oil to a flash-point of 100° Fahr., because this temperature is rarely attained in the oil-reservoirs of lamps. This seems a simple and obvious line of argument; but it is only so because it ignores a mass of indispensable considerations of the utmost complexity. We all love short and easy ways out of tight places; but unfortunately the short cuts too often prove the longest way round. To begin with, why do not the Committee put themselves in an unassailable position by showing that, as a matter of fact, lamp accidents, whether vapour explosions or sudden ignitions of escaped oil, do not occur with oil flashing at 100° Fahr. and upwards? If this were established, all opposition to making such a flash-point compulsory would collapse at once. We should certainly surrender the point without the slightest demur.

No such proof has ever been given. On the other hand, in the "Daily News" of May 1 last, there is an editorial acknowledgment of the receipt of an important communication from Mr. Braxton Hicks, as Honorary Secretary of the Coroners' Society, which conveyed the opinion of 250 Coroners throughout the country that lamp accidents "are due to the lamps, and not to the quality of the oil. *The flash point is not really in question at all, in such cases.*" Our daily contemporary thereupon offers the rational commentary that: "Of the two alleged causes of accident—low-flash oil and ill-made lamps—the former is evidently not ripe for legislation, in the present state of scientific and general opinion. As there can hardly be two opinions about the danger of the lamps, this might constitute the line of least resistance for the next move." We agree up to a point. It is too much to expect that legislation with regard to the lamps will ever make lamp users safe from consequences of their own carelessness and neglect. Consequently, there is much force in the plea for letting the whole matter alone. If there are 10 million lamps in nightly use in the United Kingdom, it will, as the County Council Committee justly opine, take a long time to leaven them with legalized lamps; and even the latter cannot be warranted proof against misuse. Our regrets on this score are lightened, however, by the reflection that the great majority of lamps are perfectly harmless, and that downright bad ones are few and far between. If those lamp accidents are eliminated from the question which are due to the essential portability of the appliance; and if reckless usage—such as lighting a duplex lamp with only one wick, the other tube being open—is also left out of the account, the scope for hopeful lamp legislation will be greatly curtailed.

One comes back, therefore, to the oil and its characteristics. Having regard to what the Coroners' Society said in May, not for the first time, something more than the *ipse dixit* of the Public Control Committee of the London County Council should have been offered six weeks later, if the prejudice of this body against the common lamp oil of the shops was intended to command respect. As it is, the Committee have not improved by one jot or tittle their case that the raising of the flash-point would be an effective way of "obtaining security." Observe, there is no qualification of this pretence. It is not hinted that security is a question of degree. If this were allowed, and the position taken up that, all other things being equal, the higher the flash-point in reason the safer the oil, it would be possible to give a general adherence to the proposition. Instead, the public are invited to believe that security, without qualification, resides in a high flash-point oil, which is absurd. Furthermore, it is declared that the raising of the flash-point to the fancy figure of the London County Council would "benefit every class of the community and injure none." This is simply untrue. Nobody has yet been bold enough to pin himself to a precise prophecy of the industrial, commercial, and economic results that would accrue from the exclusion of American kerosene from the United Kingdom. All experience goes to show, however, that the placing of an embargo upon an important article of commerce has many effects never foreseen by those who rashly intermeddled with the natural order of trade. The Parliamentary Petroleum Committee, faced with this problem, could only say that legislation raising the flash-point of lamp oil would have the effect of materially increasing the cost of petroleum to the consumer. The increase would not be confined to the particular petroleum product which is burnt in ordinary lamps; but everything else of the same origin would suffer in the same way. Meanwhile, Germany and other countries would go on rejoicing in their 70° flash-point kerosene, as at present, and every commercial and industrial advantage derivable from this supply would be lost to this country.

Lastly, the London County Council Committee seem to ignore the difference between the flash-point and the ignition-point of mineral oil. They have got the former "on the brain," and cannot think of anything else. Yet it is perfectly well known that in regard to many considerations, notably the risk of fire, the ignition-point of an oil is of far more significance than the flashing-point. The meaning of the latter term is that at the stated temperature so much of the oil volatilizes as to show a momentary "flash" at the approach of a naked flame. But the flash immediately goes out again, at this and at many degrees of higher temperature. Not one-half per cent. of a lamp oil vaporizes at the flash-point; whereas at the igniting-point—meaning the temperature at which the oil

itself will take fire from a naked light and go on burning—not only does this happen, but in the absence of a naked light, the quantity of inflammable vapour given off is from four to six times that escaping at the flash-point. Why do not the County Council deal frankly with this characteristic of all petroleum? American kerosene as prepared for the English market with a 73° minimum flash-point, only ignites at 120° Fahr. Russian oil is officially rated to have a minimum flash-point (Abel-Pensky test) of 77° Fahr. That imported into this country usually has a flash-point (by the Abel test) of about 86° Fahr. The fire-test is not applied in Russia; and we cannot say how the Russian kerosenes compare with the American product in this regard. When the lamp is broken and the oil is spilt, however, it probably matters little what tests the latter might have satisfied in the original bulk. It is in the bulk that the gas industry of this country takes its oil supply. Our case is that so important a commerce ought not to be interfered with unless the clearest case can be established for such interference in the interest of public safety; and we say, further, that no such case has been or can be made out in the ways practised by the Public Control Committee of the London Coun'y Council.

AMERICAN COMPETITION IN THE ENGINEERING TRADE

An interesting and valuable contribution to the discussion on this question is made by Sir Benjamin C. Browne in the current issue of the "National Review." Sir Benjamin (who, as our readers are doubtless aware, is Chairman of the engineering firm of Hawthorn, Leslie, and Co.) does not take an alarmist view of the situation, but rather warns the public against drawing large inferences from one or two exceptional cases which have recently attracted lively, and perhaps undue, attention. But, whilst deprecating sensational pessimism, Sir Benjamin admits that the progressive competition of American with English engineers calls for earnest consideration, and—in a spirit of deliberation and impartiality—discusses our shortcomings, and endeavours to indicate needed reforms.

We are especially struck with his refusal to throw any large share of the blame for our halting in the race upon the shoulders of the workmen and their Unions. We are very apt—and perhaps it is not unnatural—to overlook all labour troubles but our own; and to forget that, human nature being human nature all the world over, our rivals (and especially America) have much the same difficulties to contend with as we ourselves. Attention was drawn only the other day by Mr. Marshall to the fact that we have no monopoly in such harassments. Even in peaceful Denmark, he told us, "strikes are of daily occurrence; and the Continental atmosphere is heavy with impending labour troubles." And now we find an engineer-employer writing: "Whether English workmen are actually worse than other people is a point I should not care to decide. It is only fair to point out that their action has not killed the shipbuilding trade, which is honeycombed with Trade Unionism beyond any other trade. . . . We none of us know how far the instincts of Trade Unionism may not be saving us from dishonesty and many other vices to which minorities might be apt to give way were they not controlled by the public opinion of the larger number." He further declares that, while the engineers' strike of 1897 doubtless temporarily intensified the evil of American competition, it is nothing like adequate to account for the greater part of it; and that "it would be extremely difficult to trace the effect in a case such as the Atbara Bridge." Sir Benjamin's object is not to unduly minimize the injury done to trade by the strike of 1897, but to warn employers against the folly of deluding themselves with the idea that every failure in the struggle of competition is due to the hampering and unreasonable conduct of the men, and so, perhaps failing to discern, and if possible to remove, the real cause of failure.

Special attention is drawn to the discredit of our importing so large a share of our electric plant from other countries; and it is suggested that what we need, in this respect particularly, is "higher and more technical education" for the workmen, and more enterprise on the part of our manufacturers.

As to the complaints that large quantities of engineering and agricultural machinery come from the United States, Sir Benjamin points out that as "the carriage per ton across the Atlantic is often not more, and sometimes considerably less, than the carriage from one to another part of the same country, ... it is not unnatural that if an English manufacturer wants a machine of any kind he looks at the catalogues and prices of English and American manufacturers indiscriminately, . . . and places his order as between England and America just as he would beween Leeds and Manchester." Our high railway rates are then a factor in the situation in the engineering, as they are in a large measure in the agricultural, world; and the never-too-often emphasized moral may be deduced that excessive prices kill business, just as taxation beyond a certain point kills revenue. We need make no more direct reference to recent controversies on the point.

This indiscriminate placing of orders by the English manufacturer is not, however, reciprocated by the American, as the protective tariff steps in and provides the inducement to buy home-made goods. But it is not suggested that we should adopt a retaliatory tariff, and gas engineers, as users, and not manufacturers, of machinery, would certainly strongly oppose any such proposal, were such likely to be seriously made. There is no rose without a thorn; and we have to take the small disadvantages with the incalculable advantages of our Free Trade policy. The theory, propounded in these columns on May 2 last—that much of our loss of trade to America is due to the hampering and harassing conditions imposed upon manufacturers by consulting engineers, is referred to and examined in the article under consideration; and the writer declares that "no one who is not in the trade can realize the very great extent to which energy and enterprise are crippled if a manufacturer is compelled constantly to follow the caprice of one customer after another, and has no opportunity whatever of even classifying and utilizing the information that he picks up from experience."

Sir Benjamin does not attach much importance to the Atbara Bridge incident. He says: "Very probably the Americans have more demand for large bridges, and therefore were more likely to have the exact article cut and dried." His explanation of the Railway Companies having recently placed large orders for locomotives in the States, is in the nature of a criticism of the policy adopted by those Companies in building all or most of their engines themselves. By doing this, they have so far killed the outside locomotive-building trade that if there comes a sudden demand the firms are not in existence to supply it. "Twenty-five years ago . : . . there were probably a dozen firms, any one of which would have been eager to take an order for, say, thirty express engines. To-day there are probably not eight at the outside." This policy is unfavourably compared with that of our Admiralty, who, by always giving a share of the work to be done to private undertakings, keep those firms constantly expert in war-shipbuilding. "A large number of firms are thereby engaged in turning out large quantities of war-vessels, guns, and materials for foreign Powers." That is to say, it brings increased trade to the country; but, far more important, it also ensures that "in case of a war the whole of this capacity would be at the disposal of the Government; and it would give them a power of increase absolutely without parallel in the history of the world." (Brassey's "Naval Annual," 1895.) It is clearly not fair that our manufacturers should be expected to be able to cope with sudden requirements if there be no steady demand to keep plant in reasonably constant use. "It must be obvious to the most simple-minded shareholders in works that it never can be worth while to lay down plant which will be only required in the busiest times, or, say, for two or three years out of every seven or eight." Again is recent controversy recalled to our mind.

The conclusion to which a perusal of the article from which we have been quoting brings us is that, while it is perfectly certain that our English engineering trade is very far from becoming moribund, it is still more certain that we have, in Brother Jonathan, an astute, skilful, and energetic competitor. Also, to maintain our position intact against his assaults, it will be necessary for employers to do their utmost, by encouraging and supporting efficient technical training schools, and by every other means in their power, to render their workmen skilful, original, and intelligent; and for the men themselves to realize that on the prosperity of their employers depends their own, and to cheerfully put their shoulder to the wheel. We hope that their experience in 1897 will tend towards, and not away from, this much-to-be-desired consummation.

THE COMMERCIAL VALUE OF EDUCATION.

The public mind has been much exercised of late, and will, we hope, continue to concern itself, with the question of the maintenance of our supremacy as a nation in the world of commerce, and with the possible shortcomings on our part which may account for the success of our commercial rivals—notably America and Germany—in capturing some of our markets and underselling our manufacturers. Various explanations are advanced by different writers and speakers—some plausible and worthy of examination, others obviously fallacious and born of fad-ridden imaginations. But the reasons most commonly brought forward and accepted are the backward state of our technical, scientific, and commercial education as compared with that enjoyed by our rivals, and our supposed greater liability to hampering labour disputes. Attention is, however, being, we think wisely, centred upon the question of education; and it is with this aspect of the subject that we are at present concerned.

The question of scientific and technical education in direct relation to the gas industry has been given prominence of late in the President's Address to the Institution of Gas Engineers; and in this connection we have tried to urge upon Directors the necessity of adopting a higher standard of efficiency to be required of budding engineers, and have suggested the means by which we think provision may be made for more systematic and efficient training for students in the profession. But important as the technical and scientific—the engineering—staff of a gas company unquestionably is, it must not be forgotten that the prosperity of such an undertaking also depends, in no inconsiderable degree, upon the possession of good commercial and

business qualities by what we may term the unprofessional staff. Just as no skill in the business managers can retrieve money lost in the retort-house, so maladroit dealing with consumers and the commercial world will go far to counterbalance the profitable results of careful and skilful engineering; and the importance of due regard being paid to the efficiency of both sections of the staff cannot be too strongly urged.

A knowledge of the whole subject of scientific and commercial education—with special regard to the methods by which the desired ends may best be obtained—is then essential, if the requirements of any special industry are to be wisely met; and our present object is to draw attention to some recent contributions to the discussion of the subject in its broader aspects. If in a multitude of counsellors is knowledge and wisdom, we may hope that those primarily concerned (we mean those responsible for the direction of commercial undertakings—primarily only, we say, because in its final results this is a national question) will speedily be informed and enlightened. The question is in the air; and to the writing of articles thereon there is no end. Sir John Gorst, at the Commercial Educational Conference held at the Guildhall on July 8, 1898, said truly that "we cannot have high commercial education unless we have a solid basis of elementary education upon which to build." Mr. T. I. Macnamara, who speaks with the authority of experience, in an article in the "Fortnightly Review" on "Joints in our Educational Armour," asks, and answers emphatically in the negative, the question: "Have we got that solid basis?" The flaws in the foundation to which Mr. Macnamara points are, in brief:

(*a*) The lax enforcement of the attendance laws; the percentage of regular attendance in England and Wales being only just over 80, the remaining 20 per cent. being made up mainly of habitual, not casual, absentees.

(*b*) The too early age at which we permit children to leave school, either altogether, or, what is practically as bad, and in some cases worse, on the "half-time" system. The age up to which full attendance in all cases is compulsory with us is eleven years; and if, as appears probable, and most desirable, Mr. Robson's Bill passes, it will be twelve. Germany forbids child labour at any earlier age than thirteen; and the other Continental countries have long ago raised their limit to twelve. The question has been recently debated at such length in the Daily Press that we need only quote here the opinion of Mr. Rankine, one of H.M. Chief Inspectors of Schools—

> We lose the benefit of a great part of our expenditure on education, because just at the period when education in the proper sense begins, children are withdrawn from educational influences. Is it wonderful that when they do turn up at continuation classes, so many have forgotten what they have learned; and teachers have to go through the pretence of teaching science to those who require drill in the elementary subjects?

In fact it is "penny wise, pound foolish." The child's wages are earned at the cost of the inefficiency, and therefore lower earning capacity, of the man.

(*c*) The inadequate expenditure on education. We waste a good deal of what we do spend, not only from the reason above given, but also because we do not spend enough; the results of niggardliness being—

1.—Inefficient teachers. Nearly 60 per cent. of all the teachers in elementary schools are either uncertificated adults or pupil-teachers, employed, of course, because they are cheap.

2.—Insufficient teachers. Result: "It is quite a common thing to find a teacher struggling ineffectually with a great battalion of 60, 70, 80, or even 90 children. These children are, no doubt, 'minded;' but does anybody seriously imagine that they are being 'educated'?" In the United States, and in Cape Colony, the normal class is 30, in New Zealand 32!

Such are the principal reasons given in support of Mr. Macnamara's contention that for the superstructure of secondary education we desire to build, we have as yet no well-laid foundation; and his arguments demand the attention of all those who agree—and there can surely be none who will not agree—with the Committee of Council on Education that "an excellent system of public education is one of the best forms of national investment. In commercial and industrial efficiency . . . . the nation is amply repaid for what it spends." We would add that, under present conditions, it is impossible for teachers of elementary scholars to even attempt to attain the ideal for which they should all strive. We mean the ideal of training each scholar to think as well as to remember, to understand as well as to know, and, in Ruskin's words, of educating each individual "with definite respect to the work he has to do, and the substance of which he is made."

But leaving the question of elementary training, and assuming a complete and satisfactory system, how do we stand with regard to the provision of the special education which is to fit the rising generations to successfully compete with the other nations in the markets of the world? Sir Henry Trueman Wood, the Secretary to the Society of Arts, in a paper read at the recent International Congress on Technical Education at Venice, and now published in the "Journal" of that Society, has given a comprehensive survey of the history and present position of "Commercial Education in England," including therein the provision made for scientific and technical education; and the same subject is dealt with, in perhaps the more useful form of practical suggestions following upon history, definition, and criticism, by the Rev. H. de B. Gibbins, M.A., in an article in the "Fortnightly Review" having the attractive title of "'Made in Germany;' and How to Stop It." Both these authorities are agreed that we lag far behind our rivals in our provision and our methods of educational training for the battle of commercial life; and, further, that such means as we do possess often fail of their purpose from want of organization, co-ordination, and systematization. Sir Henry Wood, in concluding his paper, says: "On looking over what I have written, I find that it bears a great similarity to that ancient worthy Horrebow's celebrated chapter on 'Snakes in Iceland,' and that my remarks have been, in the main, a demonstration of the non-existence of any provision for commercial education in England. As regards higher specialized commercial education, this is certainly the case." Another point which both the above-named emphasize is that "any attempt to teach special subjects at an early age is wasted, so far as they are taught with a view to practical application." Commercial education, says Mr. Gibbins, "implies, in the first place, a general training of all the mental faculties. . . . It must presuppose a sound preliminary knowledge of all those subjects—such as Latin, Euclid, Mathematics, Science, and, above all, English History and Literature—which are essential, not only to any cultivated person, but to anyone who aspires to become an intelligent citizen of a modern State. . . . A wide general knowledge of men and things is the soundest basis for a successful man of business; and nothing can aid him to obtain this better than a good groundwork of general information learned at school."

We gladly endorse this protest against the prevalent but most mistaken idea that a boy is necessarily wasting such time as he may spend on subjects of which he will apparently be unable to make any direct practical use in his business. Such a narrow view of education leaves altogether out of account the value in everyday life of a mind trained to think for itself, and possessing, in its diversified interests and pursuits, the means of ready relaxation and recuperation after close application to the routine of business. The vapidity and lack of originality so noticeable in the rank and file (and even in the higher orders) of commercial men, are very largely due to the fact that their education has not provided them with mental resources sufficient to enable them to profitably employ their leisure hours—we speak in the broad, not in the priggish, sense of "profitably"—has, in fact, only taught them how to read, and not what to read, and the uninstructed reading, mainly of scrappy, ephemeral papers and magazines, in which they therefore too freely indulge, only produces mental indigestion and intellectual atrophy.

It is perfectly true that not one man in a hundred who crosses the *pons asinorum* in his schooldays ever finds in after-life direct practical use for the knowledge that the angles at the base of an isosceles triangle are equal to one another; but every man who has ever learnt to exult in the solution of a rider in Euclid or an equation in Algebra will find the value, in all paths of life, of the logical habit of mind so acquired. The point which Mr. Gibbins (himself an experienced schoolmaster) urges, is that, while special education should not begin too early, schoolwork should be part of the whole plan whereby such special education can be attained. He says—

> If you do not interest the schools in the question of commercial education, you will never get it properly started among the vast majority of the people. . . . The result of science teaching in schools is seen in the popularity of science classes for those whose schooldays are over. Do the same for commercial instruction, and the students will come fast enough; but do not imagine that you will ever obtain many students by merely setting up a crowd of independent examiners for those who have never learnt a word of commercial subjects in the junior class-room.

What then does Mr. Gibbins propose? After premising that the young man going into other than strictly professional business wants chiefly to have made special application of some of the general knowledge he has already acquired, and having given a first-rate outline (to which space forbids us to do more than refer the reader) of what the subjects are in which the young man needs special training, Mr. Gibbins concludes—

> Let a Department of Commerce be established on the same lines, somewhat improved may be, of the much-abused, but not altogether inadequate, Department of Science and Art at South Kensington. *Begin, as it began, with a fairly low standard*, but with a regular and well-organized system. Lay down the qualifications of the teachers, and provide for their being taught those qualifications. Establish one set of examinations by one body, not a dozen different sets by a dozen different bodies. . . . It would not cost very much; and, even if it did, it is well worth our while to spend a few thousands a year (e en a small Continental State like Switzerland spends £24,765 a year in grants for Commercial Education) . . . to raise up a new generation of English merchants . . . who shall be able to remove from our home and foreign markets the reproach of being swamped by articles "Made in Germany."

We look with much hope to the new University of Birmingham to supply this really long-felt want; and we trust that such institutions as we already possess will co-operate therewith, so that we may have one good ordered system of technical and commercial education, built up from the necessary foundation of a sound elementary training, with the University as the crown of the harmonious whole. As was once well said, "How much good we can do in the world, if we do not care who gets the credit!" Do not let the old-established Institutes be jealous of, but cheerfully subordinate themselves to, the new-born University. There is an opportunity for the City of London Guilds to display their accustomed liberality. Will they not found open scholarships in connection with Birmingham?

PERSONAL.

Professor MOISSAN has been elected a foreign member of the German Electro-Chemical Society.

Increases of salaries have just been granted to the Gas and Water Engineers of the Bolton Corporation—Mr. W. SMITH and Mr. R. H. SWINDLEHURST—the addition made being in each case £100 per annum.

Mr. W. T. TOMLINSON, the Manager of the Rochdale Corporation Water-Works, has been appointed Manager of the newly-acquired works of the Corporation at Ramsden; and, in consideration of the additional duties which the change will entail, his salary is to be increased by £100 per annum.

In a previous issue of the "JOURNAL," we noticed the appointment of Mr. W. LANGFORD, Assistant Gas Manager at Bath, as Engineer and Manager of the Longton Gas-Works. During his service of 22½ years with the Bath Company, he has gained the respect and esteem of all those with whom he has been associated; and these feelings recently found expression in presentations made to him before leaving the city to take up his new duties. The testimonial from the officials consisted of a suitably inscribed watch and a set of carvers; the workmen's gift being a handsome gilt timepiece. The Secretary of the Company (Mr. G. Helps) presented the former, and testified to the ability and tact invariably displayed by Mr. Langford in the discharge of his duties; the Engineer and Manager (Mr. C. Stafford Ellery) endorsing his colleagues remarks, and wishing Mr. Langford every success in his new sphere. Mr. Ellery had a further opportunity of conveying good wishes to his assistant when he subsequently presented the workmen's testimonial. On each occasion, Mr. Langford suitably expressed his thanks to the donors for their kindly feelings and generous gifts. The members of the chapel with which he was connected testified their personal friendship for him by presenting him with a complete set of Thackeray's works, accompanied by a gift for Mrs. Langford.

OBITUARY.

The death took place recently, at the advanced age of 90 years, of Mr. ALEXANDER SMAIL, Chairman of the Haddington Gas Company.

The death is announced of Mr. HENRY HOLMES, the Chairman of the Wye Gas Company. He was much esteemed in the town, having long resided there, and being of a very benevolent disposition.

The death has lately taken place, at a comparatively early age, of Mr. WILLIAM ROBERTSON, who for some years had the superintendence of main-laying works of the Glasgow Corporation Gas Department.

The death is announced at Whitchurch, near Cardiff, of Mr. GRIFFITH PHILLIPS, one of the oldest, as well as perhaps one of the largest, shareholders in the Cardiff Gas Company. He was one of the original promoters of the undertaking, and first introduced gas to Cardiff; having had small gas-works erected in the town. The streets were not lighted with gas until 1856, when, by the Cardiff Gas Company's Act, the supply of gas for street lighting purposes was rendered compulsory. Mr. Phillips was at an early period a Director of the Company, and was also Chairman of the Water Company before the undertaking was acquired by the Corporation. He was in his 87th year.

The Gas Department of the West Bromwich Corporation have just been deprived of the services of their Outdoor Superintendent, Mr. W. H. WAYTE, under painful circumstances. He had complained of overwork, and his health had broken down. Early in June he consulted a medical man, who advised him to take a month's holiday; and he said he would do so later on. It was noticed on the 28th ult. that he was dejected, and late in the evening he went out and did not return. His body was found in a pool last Wednesday morning. Deceased, who was 48 years of age, was held in very high esteem by the members of the Council and the town generally. He took an active interest in the work of the St. John's Ambulance Association, and was Honorary Secretary to the West Bromwich centre. He was also a prominent member of the National Union of Fire Brigades and was Captain of the local Brigade.

The "American Gaslight Journal" for the 26th ult. contains a notice of the death of Mr. WILLIAM WHITWELL GREENOUGH, which took place, after a brief illness, at his home in Boston, in his 81st year. From 1854 to 1889, Mr. Greenough served the Boston Gas Company nominally as Treasurer, but actually as its moving and maintaining spirit. Under his guidance, the Company grew and prospered; and from 1860 to 1888 it was quoted as one of the model gas undertakings of America. He was the first President of the New England Association of Gas Engineers, and held office from 1871 to 1875. In the last-named year he declined re-election, and was succeeded by his friend the late Mr. G. D. Cabot, of Lawrence (Mass.). He was elected an honorary member of the American Gaslight Association at its sixth annual meeting, held in New York in 1878; his son, Mr. Malcolm S. Greenough, who was then to all intents and purposes Engineer of the Boston Gas Company, being on the same occasion admitted to membership. Deceased leaves a widow, a daughter, and three sons.

NOTES.

The Use of "Nitragin" with Manures.

The latest information concerning the manurial action of the so-called "nitragin," or bacterial preparation for assisting the fixation of atmospheric nitrogen, is published in a report of the Bavarian Government Agrarian Department. A number of experiments have been made with these cultures of the nodule-bacterium, from which it has appeared that they do little or no good on good, kindly, humous soils. But the action of the preparation on purely mineral or sandy soils, other conditions being favourable, causes a considerable increase in the yield of leguminous crops. Plants of this order, which are very easily affected by the presence of lime, show no stimulation when the lime-containing soils are treated with the bacteria; but if a readily assimilable, nitrogenous manure be applied at the same time, considerable improvement takes place. In all cases, a dressing of nitrogenous manure simultaneously with the "nitragin" is beneficial, and should be given even when the bacteria are sown in large proportions. Thus, the idea once entertained that the applications of bacteria-cultures would supersede the employment of artificial nitrogenous fertilizers, such as sulphate of ammonia, is proved to be erroneous. It remains to be shown how the cost of manuring should be divided as among the different constituent fertilizing agents.

Centrifugal Gas Washing.

An interesting use of the centrifugal method of scrubbing or washing gas, has been made in the Thiessen process, described by Zimmersbach. In this arrangement, applied to the thorough cleansing and removal of dust from blast-furnace gases, the principle is followed of mixing very thin layers of the gas with the water or lye. The centrifugal action is stated to bring the gas into the most intimate contact with the water, taking out every particle of dust. At the same time, the machinery has an aspirating effect of 10-10ths to 15-10ths; the gas travelling at the rate of 150 to 200 feet per second. The water, after taking up the dust, is drained into settling tanks for use over again. Special exhausters are unnecessary, as the centrifugal machine is a gas propeller as well as cleanser. It is stated that an apparatus 7 feet high and 8 feet in diameter can deal with from 10,000 to 11,000 cubic feet of gas per minute. With regard to the recovery of the bye-products, it is found that the tar is thrown out of the gases very completely. Cooling towers are not required, as the process of removing the condensable matters is very thorough, while the tar is nearly free from water, by reason of the initial high temperature of the gases at the point of separation. Ammoniacal water is also removed in the same apparatus, apparently at a later stage. The treatment of crude coal gas by the centrifugal system of separation has been suggested, but not realized in ordinary practice.

The Blacksmith's Paradox.

Last year we mentioned in this column, more than once, certain observations originally published in "Nature" relative to the phenomenon of the sudden heating of the cool end of a forged bar of iron when the hot end is plunged into water. The fact of the phenomenon was first vouched for, and subsequently denied; and there the matter rested for a time. Professor E. Lagrange has recently written on the subject to the "Bulletin" of the Belgian Academy, describing experiments which show that the effect in question exists, and is quite compatible with the known laws of heat conduction. Professor Lagrange's treatment of the subject is an example of true scientific method. When a credible witness avers that a physical phenomenon has occurred within his experience, it is no answer for another witness to say that he has never seen anything of the kind. The first step towards the explanation of the phenomenon, is its reproduction. Professor Lagrange finds the solution of the blacksmith's puzzle in the condition that the bar must always be removed from the fire before the stationary point in the transmission of heat has been reached. The temperature of the unheated end is increasing at the time of removal; and as its rate of change does not vary discontinuously, the temperature continues to rise after removal. When, under these conditions, the hot end of the bar is suddenly cooled, Professor Lagrange finds that the other end attains its maximum temperature sooner, and that this maximum is considerably lower than when the hot end is slowly cooled. If, however, the bar is kept in the fire until the flow of heat through it has become steady, no further increase of temperature takes place at the other end, whether the hot end is cooled slowly or suddenly; but the unheated end begins to cool at once, and the rate of cooling is faster in the second than in the first case. This explanation, it will be noticed, does not explain the phenomenon, but only states the conditions under which it occurs. It still remains paradoxical that the sudden quenching in water of one end of a bar should make the other end appreciably warmer to the hand.

Reservoir and Tank Linings.

The "Engineering Magazine" describes some recent experiments in the construction of small reservoirs, or water tanks, in different parts of the United States. In one example, in Colorado, the reservoir was lined with brickwork in asphaltic cement. The contractors entered into an engagement to keep the lining sound and in good repair for five years. The bricks

were mostly machine made, and were dipped for half their width in hot asphalte, and then laid on edge in position. The joints and cracks were afterwards filled with asphalte swept over the surface with brooms. The bedding for the bricks was sand, varying in thickness with the inequalities of the rocky bottom of the excavation. The bricks for the side walls were entirely dipped in asphalte, except for the small space where they were held. After they were placed, they received a coating of asphalte. All dipping of bricks was done by hand in barrows of asphalte, kept hot by coke fires. The wall lining was of the thickness of one brick, laid flat. After the wall was built, several open joints were observed. These were raked out, and pointed with a rich mixture of asphaltic cement and sand, just as an ordinary wall is pointed. In another reservoir, at Lancaster, Ohio, which was half-sunk in a subsoil composed of clay overlaying soft sandstone, the first layer of the lining was 8 inches of Portland cement concrete. On this a course of brick was laid on the flat. This course was then covered with 1 inch of cement, to form a cushion for an inside lining of brick on edge, in cement. The work has remained perfectly sound. The last example was really the curing of a leaky puddle and brick tank, which could never be filled. The whole of the brick lining was taken off, and the puddle well drained. Brick was then laid, and painted with a coat of refined bitumen and benzine. Neuchatel asphalte mastic, at a temperature of 400°, was then spread over all, in two layers, to a total depth of 1 inch. It is suggested that an improvement on this would be to use a thinner layer of asphalte, and cover it with 1-inch tiles dipped and bedded in the asphalte. When tanks are lined with asphalte, particular attention must be paid to the coping, as it is fatal if rain or surface water gets in behind the coating.

The Oxides of Rare Metals.—MM. G. Wyrouboff and A. Verneuil have lately dealt with the above subject in a contribution to the Paris Academy of Sciences. Considerations relative to the formation of various complex salts of cerium and thorium lead to the suggestion that the oxides of these metals have the formulæ $(CeO)_3$ and $(ThO)_4$ respectively, in which one of the CeO or ThO groups differs in function from the rest.

Action of Gases on Caoutchouc.—M. D'Arsonval finds that, at pressures varying from one to five atmospheres, caoutchouc absorbs large quantities of carbonic anhydride, and at the same time increases considerably in volume and becomes more gelatinous and less elastic. On exposure to air, the gas is gradually lost, and the substance resumes its original properties. In virtue of this property, vessels of caoutchouc readily allow carbonic anhydride to pass through their walls. The action is much slower in the case of oxygen, and is very slight with nitrogen.

The Gas Question in Vienna.—Referring incidentally to this question in the course of a recent letter, the Vienna Correspondent of the "Financial News" remarked that the party of Dr. Lueger denounced the high prices charged by the Imperial Continental Gas Association, and promised the people very much lower ones when the new Municipal gas-works were ready. It is now clear, he says, that the new Municipal undertaking will not be able to supply gas at a lower rate—indeed the cost of the works will be much higher than the Association were prepared to take. This, he adds, is "the result of frivolous opposition, for which the public will now have to suffer."

Discovery of Iron Ore at the Dover Colliery.—Reports have lately appeared in some of the papers of a discovery of iron ore at the coal boring at Dover. When this work was commenced about six or eight years ago, there were indications in the bores drawn of the presence of iron ore in the strata between 500 and 600 feet from the surface. These indications have now proved correct. In the course of sinking the second shaft, a bed of valuable oolitic iron ore has just been struck at a depth of rather less than 600 feet. The seam proves to be no less than 12 feet thick, and probably extends over a great area; the quantity being practically unlimited. The diameter of the shaft is 20 feet; and the amount brought to the surface in passing through the 12 feet was about 350 tons. Some of the ore has been submitted to analysis; and it is stated that a washed sample yielded 45·8 per cent. of iron.

Effect of Scraping a Water-Main.—It was recently reported to the Water Committee of the Plymouth Corporation that a portion of the large main conveying the supply of water to the town had become so affected by corrosion and the deposit of silt as to seriously diminish the rate of delivery. As there is a rapidly growing demand, Mr. E. Sandeman, the Water Engineer, informed the Committee that it would be necessary to either remove this incrustation or lay another main to provide for the maintenance of the supply. As the main is 24 inches in diameter, and the length affected is considerably more than a mile, it was decided to try whether the deposit could be scraped off before considering the alternative of laying a new pipe. A pipe-scraper of the requisite size was obtained, and a few days ago it was used with excellent effect. It consists of a number of steel knives attached to a central spindle, and actuated by pressure of the water through the medium of two pistons. It was passed through the pipe in two sections of about three-quarters of a mile each, and the operation resulted in the removal of many tons of matter—in fact, the pipe is apparently clean, and the flow of water has been increased by from 2 to 3 million gallons daily.

TECHNICAL RECORD.

THE GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Annual General Meeting.

The Thirty-ninth Annual General Meeting of this Association took place on the 19th to 21st of June, at Cassel, under the presidency of Herr W. von OECHELHAEUSER. There was an unusually large attendance of members and their friends, as is indicated by the facts that 570 tickets for the meeting were issued, and 476 persons attended on the first day. The technical communications presented were, on the whole, more than ordinarily interesting and meritorious, as will appear from the following account of the proceedings, which is taken from the report in the "Journal für Gasbeleuchtung," the official organ of the Association.

The customary addresses of welcome to the members on the part of the Local Authorities having been delivered and duly acknowledged on the morning of the opening day, the President announced that a new body already numbering 44 associates—the Association of Gas and Water Engineers of Lower Saxony—had become affiliated to the Association. He then delivered his Inaugural Address, on "Technical Advances in the Gas Industry and Allied Industries." He compared the relative merits of coal gas, electricity, acetylene, and water gas as lighting agents, and expressed regret that the Nernst lamp was not exhibited at the meeting, as he had hoped that it would be. He pointed out that great improvements had been made in incandescent gas lighting, both in respect of the illuminating power of the light, which had been raised from 50 to over 75 candles, and in regard to the constancy of the light afforded by the mantles. Thus gas lighting had quietly made an advance not inferior in its economic importance to that experienced by electricity in the invention of the Nernst lamp. Moreover, experimental results, which were recorded on diagrams on the walls, indicated that the illuminating power of gas, as found when it was consumed in flat-flame burners, could be greatly reduced, without appreciably diminishing the calorific power of the gas and its illuminating effect in the Welsbach burner. The address was received with great applause.

Herr Merz, the Manager of the Cassel Gas-Works, then described the development of the gas, water, and electricity works of that town. Dr. Bunte next illustrated by experiments an account of recent researches on the "Phenomena of the Combustion of Gases." He demonstrated that methane and the heavy hydrocarbons or illuminants of illuminating gas, notwithstanding their high calorific value, produced a considerably lower illuminating effect in the Welsbach burner than hydrogen, which does not burn with a luminous flame. Hydrogen also, he said, was the only constituent of illuminating gas which could be caused to ignite automatically; so that a gas which was ordinarily regarded as poor ignited more readily and certainly than a highly illuminating gas. Dr. Bunte's lecture excited great interest; and it was generally conceded that the facts he had made known would very rapidly find practical recognition and application.

Herr Kunath, of Dantzig, followed with a communication on the "Effect of Electrical Central Supply Stations on the Gas Supply of Towns." He showed, by the aid of diagrams giving the consumptions of gas and electricity in recent years in a large number of German towns, that in most cases the demands on the productive capacity of gas-works had not been diminished by competition of electricity supply stations. This effect of the competition of electricity on gas supply, though familiar to gas engineers who have studied the question, came as a revelation to many municipal authorities, who had supposed that with the adoption of electricity supply works further expenditure on gas-works would be rendered unnecessary. Herr Joly, of Cologne, supplemented Herr Kunath's communication by more complete diagrams in respect of the Cologne undertakings.

The next paper was by Dr. Bueb, of Dessau, on "Purification of Coal Gas, with Recovery of Bye-Products." He dealt with the removal of naphthalene, and the rational recovery of cyanides. The as yet only partially elaborated methods of purification which he described had already given valuable results, and seemed likely to afford a practicable new process which would overcome naphthalene troubles, and at the same time give a great increase in the value of the bye-products obtained. The paper was discussed by Herren Sartorius and Gellendien, and by Dr. Bunte. The last named spoke of a simplification and amalgamation of the various processes for the purification of gas. Herr Streichert pointed out that permission had been refused in Berlin for the erection of plant for the working up of bye-products; and thereupon a discussion on the sanitary aspects of such plant was opened, and pursued by Herren Bueb, Leybold, Freier, and Dr. Bunte. A paper by Herr Liegel, of Stralsund, on the "Prevention of the Thickening or Condensation of Tar," was, in the author's absence, partially read by Herr Salzenberg; and therewith the proceedings of the first day terminated.

The second day (the 20th ult.) was devoted to matters relating to water supply. Dr. T. Weyl, of Charlottenburg, read a paper

on the "Use of Ozone for Rendering Drinking Water free from Bacteria," in which he attacked the efficiency of sand filtration of water. The paper evoked a lively discussion, which was renewed after Herr Beer, of Berlin, had read his report on the "Work of the Commission of German and Foreign Experts on Sand Filtration." This report very opportunely followed Dr. Weyl's paper, as the Commission had been able to refute earlier attacks on the sand-filtration process, which is adopted at many large German towns which are unable to obtain direct and unimpeachable supplies of water.

Herr Grahn next gave an abstract of a communication on "State Organization for the Construction of Public Water-Works;" and at the conclusion he brought forward a proposition, which had been printed and circulated beforehand among the members, to the effect that, in view of the success achieved in Wurtemberg, Bavaria, Baden, and Alsace-Lorraine by State regulation of water supply, the extension of the system to other German States should be advocated by the Association, and steps taken to raise an agitation in its favour. The proposition, which stood in the names of Herren Grahn, Fischer, van Hasselt, Lindley, Meyer, and Schmetzer, was discussed by several members; but, at the instance of Herr Wellmann, it was rejected by the meeting. Herr Götze, of Bremen, then gave a communication on "Sand Filtration in a Drum Driven by the Water;" and Herren Schertel and Beer made some comments thereon. This brought the day's proceedings to a close.

The third day (June 21) opened with a paper by Herr Körting, on the "Present Position of Acetylene Lighting." It was discussed by Herr Schäfer, of Dessau, and Dr. Münsterberg, the Manager of the Allgemeine Carbid-und Acetylen-Gesellschaft, of Berlin. Then Herr Lindley, of Frankfort-on-Main, gave some observations on "River Water Supplies," with special reference to the water supply of Warsaw; and Herren Beer and Götze commented on the subject. Herr Bodmer, of Duisburg, spoke on the "Venturi Water-Meter," which has proved very satisfactory for measuring large quantities of water.

Then followed the reading of the reports of the numerous Committees of investigation appointed by the Association. We hope to refer again to these reports in an early number of the "JOURNAL." Herr W. von Oechelhaeuser was re-elected President of the Association, with acclamation; and Mayence was chosen as the *venue* of next year's meeting. The afternoons and evenings of the three days were devoted to visits to works and festivities; and the gathering concluded on Thursday, the 22nd of June, with an enjoyable excursion.

DELLWIK'S WATER-GAS PROCESS.

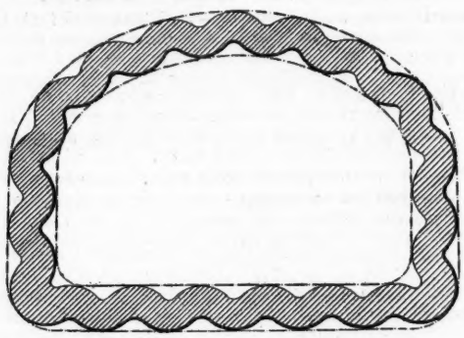
In an article which is reprinted in "Der Gastechniker" from the "Ostsee Zeitung," Dr. Wimmer reviews the modern development of water-gas manufacture, and the respective advantages of coal gas and carburetted water gas. The information he gives is interesting and perfectly sound; but only some facts relating to the Dellwik installation of water gas at Königsberg, in Prussia, are likely to be unfamiliar to readers of the "JOURNAL." Though some details have from time to time been given in our pages, for the sake of completeness we reproduce a summary of Dr. Wimmer's remarks on this installation.

The Dellwik generator produces about double as much gas from a given weight of coke as the old type of water-gas generator yields. The steam is converted almost wholly into carbonic oxide and hydrogen. The gas formed contained only about 1 per cent. of carbonic acid. The Königsberg installation on the Dellwik system has been in use since November last year. It has a productive capacity of 530,000 cubic feet per diem. There are two generators, consisting of cylindrical iron shells, with fire-brick linings. They are charged with coke. The blows are from 2 to 2½ minutes' duration; the runs, 10 to 12 minutes. The gas passes from the generators into a washer, which is situated between them. This washer serves both as a condenser and a scrubber. Dust, silica, &c., carried by the gas are separated from it in this vessel. Only two hands are required to work the plant. The gas is carburetted before it enters the holder by means of a Leybold carburettor supplied with benzol. The amount of benzol employed is 6¼ lbs. per 1000 cubic feet of gas. The maximum amount of water gas so far added to the coal gas on any evening has been a quantity representing 17 per cent. of the mixed gas. In a 32-hole argand burner, the mixed gas afforded a light of 17 Hefner units at a consumption of 180 litres (6·36 cubic feet) per hour. This burner, therefore, appears to show that the gas has a value of rather less than 12 English standard candles, when calculated to the 5 cubic feet per hour standard rate of consumption. The mixed gas, however, is stated to give a much brighter effect than coal gas with the Welsbach burner. Deposition of benzol from the gas occurs only in trifling quantities—at the most 10 per cent. of the amount used—even at very low temperatures. The calorific value of the mixed gas averages 142 calories (at 180°C.) per cubic foot. The generators produce about 40 cubic feet of gas per pound of carbon, or about 32 cubic feet per pound of dry coke. An increase of 12 per cent. in the consumption of gas at Königsberg has been met solely by the water-gas plant, while the number of settings of retorts in use has been reduced from 27 in the preceding year to 23 this year.

TEISSIER AND NEGRE'S UNDULATING RETORT.

When noticing, in the "JOURNAL" for the 27th ult., the proceedings at the recent congress of the Société Technique du Gaz en France, it was mentioned that the Committee had awarded a prize of 300 frs. to MM. Teissier and Nègre, for having made a notable improvement in gas plant by the invention of the "undulating," or corrugated, retort. This appliance, which is shown in the accompanying illustration, was briefly described in the "JOURNAL" about four years ago (see Vol. LXVI., p. 92); and its characteristics may possibly be known to some of our readers. A few particulars as to its working will therefore be of interest. These are taken from an abstract of the report on which the Committee of the above-named Society made their award, which appears in the current number of the "Journal des Usines à Gaz."

MM. Teissier and Nègre presented a paper to the Society in 1896 on the subject of their retort, and mentioned the works in which trials had been made with it. A report was presented by the Committee to the meeting held at Clermont-Ferrand in that year, in which they expressed the opinion that a long series of experiments would be necessary before a definite opinion could be given as to the actual value of the invention. These experiments have since been carried out, and the results submitted to the Committee. The problem set before the inventors was to produce the maximum heating surface with the minimum thickness of material; at the same time preserving in the undulating form the solidity possessed by retorts of the ordinary kind, and ensuring at least equal facility of working. The inventors consider that they have solved the problem with their retorts 40 mm. (1·6 inches) instead of 70 mm. (2·8 inches) in thickness, and having 12 per cent. more heating surface. Since 1896 certain changes in detail have been made in the manufacture of these retorts, the effect of which has been to remove some of the defects then pointed out; and in compliance with the wish expressed by the Committee, the inventors allowed two years to elapse before submitting further observations.



The first results recorded are those obtained at the Elbeuf Gas-Works; and they are confirmed by M. Lemerle, who is the Superintendent of the works. The retorts employed by him are 8 ft. 6 in. long, 2 ft. 2 in. wide, and 14¾ inches high. He has four-hour charges, which vary in weight from 2½ to 2¾ cwt.; and each setting yields from 60,000 to 63,500 cubic feet of gas, against 42,400 to 45,900 cubic feet produced by the other settings. The firing expenses are the same in the two cases. The undulating retorts therefore yield from 25 to 30 per cent. more gas than the others. M. Lemerle has not noticed any greater liability to fouling in the case of these retorts; and scurfing by air is easy. The life of the retorts is the same as that of the ordinary kind.

In addition to the Elbeuf trials, others have been carried out by the South Metropolitan and Paris Gas Companies. The first-named Company have 200 retorts in service, with satisfactory results. The particulars obtained in regard to their working agree in the main with those furnished by the inventors. The trials made by the Paris Company were with 177 retorts, distributed over the Company's stations at Boulogne-sur-Seine, Passy, Clichy, and La Villette, as well as at their experimental works. It was at the last-named place that observations could best be made on the working results, as at the ordinary stations it was impossible to separate the products of the undulating retorts from those coming from the other settings under fire. At Clichy a bench has been at work for about six months. The retorts there are 2 inches thick. In the works at Passy there are eight settings; and at Boulogne there is a single setting.

The Committee say the particulars they were able to obtain agreed with those furnished by the inventors. It seems that the undulating retorts become foul less rapidly than those of the ordinary kind, owing to the finer grain of the material of which they are composed. Scurfing is not more difficult than usual; and in the Paris Gas Company's works it is done with the bar. Sometimes the graphite adheres more firmly than at others, without, however, presenting any difficulty. The pieces removed take the form of the undulations. A setting of seven of these retorts has been charged up to 24 cwt.; whereas those of the ordinary kind could only take 21 cwt. A saving to the extent of

5½ bushels of coke per furnace is reported, in addition to the greater yield resulting from the heavier charge. The trial has been sufficiently satisfactory to the Paris Gas Company to justify them in ordering 666 more retorts, and in entering into an arrangement with MM. Teissier and Nègre to manufacture in the Company's fire-brick works, retorts of their pattern, and supply them commercially.

In the foregoing facts the Committee saw proof of a distinct improvement introduced into the manufacture of gas-making plant. They based their opinion solely upon the results laid before them; and they close their report by expressing regret that they were not more numerous.

THE ARROL-FOULIS HYDRAULIC STOKING MACHINERY.

As mentioned on June 27, in the notice of the proceedings at the recent meeting in Paris of the Société Technique du gaz en France, one of the papers read was upon the above-named subject; the author being Mr. C. E. Brackenbury, Assoc.M.Inst.C.E., of London. The following is an abstract of the paper:—

The author introduced his subject by referring to the increased demand for gas, notwithstanding the competition of other illuminants, and to the ever-growing quantities of material to be handled. He also remarked on the frequency of labour troubles, and higher prices generally. He touched upon the initial difficulties encountered with stoking machinery, and traced its growth; citing Mr. John West's manual charging and drawing machines introduced at Maidstone in 1875, the compressed air machines at Beckton in 1883, the rope-driven installation at Blackburn in 1889, and the hydraulic machines of Sir William Arrol and Mr. Foulis at Glasgow in 1890. The possibility of the adoption of electrical power, with its advantages as regards adaptability, speed, and cleanliness, was suggested.

The general arrangement of the Arrol-Foulis machines with which our readers are familiar (fig. 1), was then explained. In the particular installation described, Durham coal is used; and it is brought into the works on an elevated railway siding running alongside the coal-stores. From the coal-breaker it is raised and conveyed across one retort-house to another, where it falls into two fixed hoppers, each of 10 tons capacity. A 25-horse power steam-engine is geared directly on to the coal-breaker; but the author said he preferred driving by a belt from an engine on the ground level. A simple but ingenious arrangement recently patented by Mr. Maurice Graham, of Messrs. Graham, Morton, and Co., Limited, was alluded to. It consists of a revolving drum placed immediately underneath the coal-breaker.

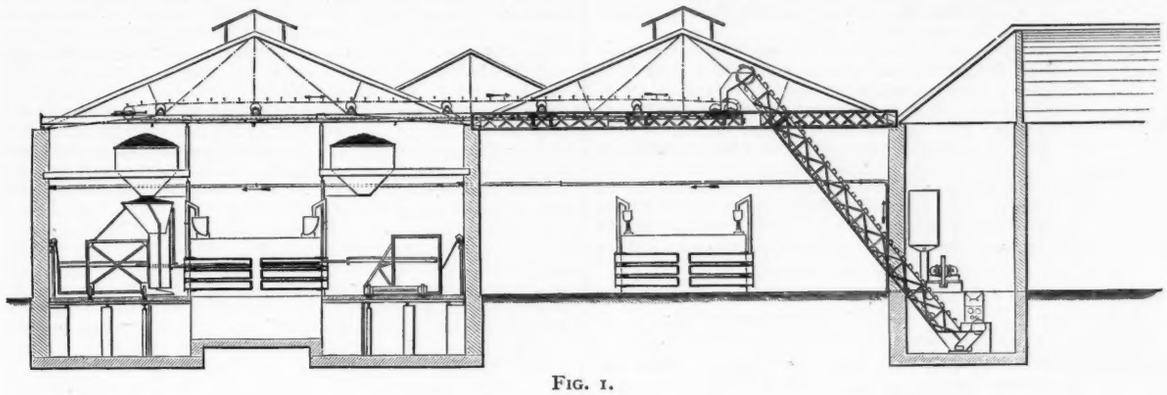


FIG. 1.

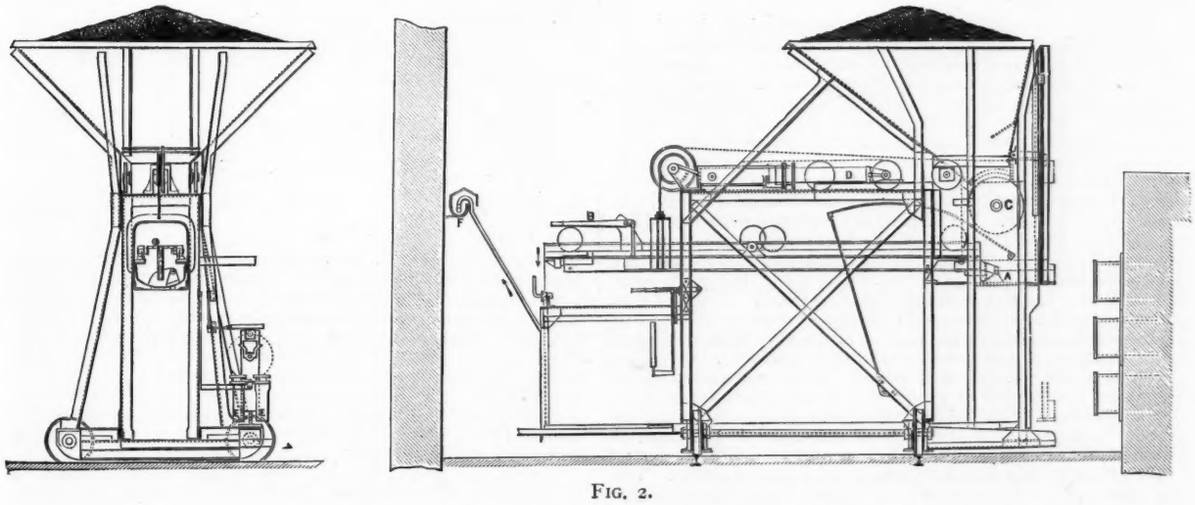


FIG. 2.

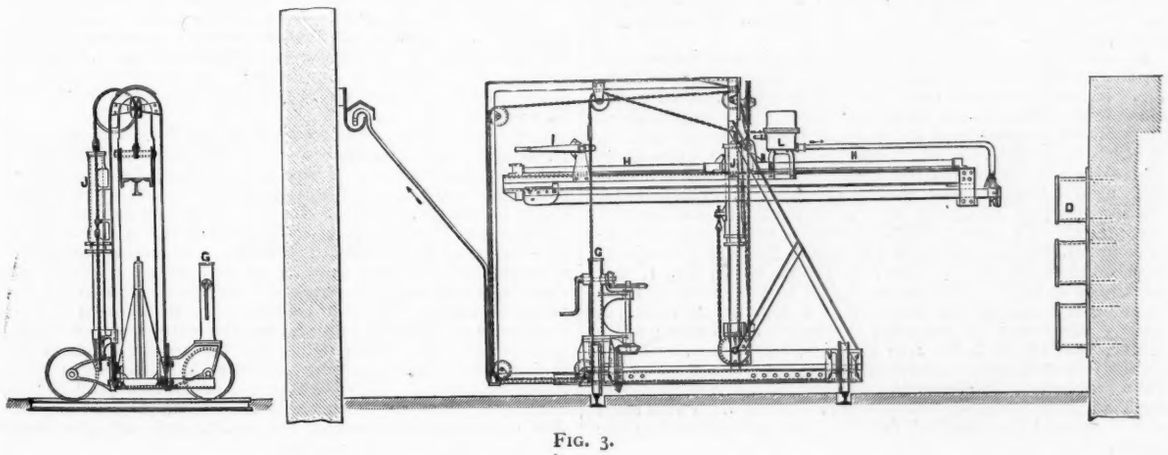


FIG. 3.

This gives a regular automatic feeding to the elevator buckets, prevents the boot from becoming choked up, and allows the coal to be heaped up above the breaker; thus economizing labour. Two hydraulic pumping-engines give the working pressure of 400 lbs. to the square inch.

A description followed of the charging and drawing machines, figs. 2 and 3. Each pair of machines draws and charges 64 retorts every 4 hours 48 min.; 32 retorts being drawn and charged, on an average, in about 45 minutes. They are blocked retorts, with a section of 650 mm. by 350 mm. (25½ in. by 13¾ in.). It was found that the usual charge of 175 kilos. (3½ cwt.), when worked by hand, had to be reduced to about 150 kilos. (3 cwt.) with the machines, owing to the difficulty of getting the rake-rod head over the burnt-off charge. When the 16 arches, or 128 retorts, referred to were worked by hand labour, 80 men were required per 24 hours. The average quantity of coal carbonized was 96 tons, at a cost of 3·58 frs. (say, 2s. 8d.) per ton; or, adding wear and tear of stokers' tools, 3·69 frs. (2s. 9d.) per ton. With the machines for the same arches 44 men are required, including a fitter and his assistant. About 92 tons of coal are carbonized per 24 hours, at a cost of 1·48 frs. (say, 1s. 1d.) per ton; or allowing for full depreciation and wear and tear, 1·96 frs. (1s. 5½d.) per ton. The net saving, therefore, per ton of coal carbonized by the use of machines instead of hand labour was 1·73 frs., or 1s. 3½d. These figures include all the expenses, from carrying the coal from the stores to taking the coke to the yard, as well as looking after the furnaces.

The author went on to remark that there were further advantages, other than financial ones, arising from the adoption of stoking machinery; among them being the fact that the class of labour in the retort-house increases in intelligence, which indirectly improves the general staff of workmen employed. He then pointed out the essential features of an ideal installation of stoking machinery, and incidentally strongly condemned the practice sometimes followed of having only one ascension-pipe to two or more retorts. The paper concluded with a tribute to the abilities of Sir William Arrol and Mr. Foulis, and by briefly describing other installations, photographs of which were shown.

GAS-PIPE ENGINEERING.

The following article dealing with some practical topics on the above subject, specially written for the "American Gaslight Journal," by a "Gas Engineer," appeared in a recent number of that publication:—

As is known to gas engineers, long continued service of gas-pipe materials, in connection with the influence of gases and atmospheric changes, eventually results in certain alterations in the structure and properties of the parts. Pipes and piping materials which are exposed to alternate moisture and dryness, to fumes of acids in bleacheries or dye plants, to steam discharges in boiler-rooms or steam-laundries, to dampness in underground places, to rust, wet, &c., necessarily alter in their composition. In some cases the structure of the material becomes more crystalline and brittle; in others, the metal loses some of its ductility. If the metallic portions were tested for the yield-point and tensile strength after several years of service in exposed places, both the former and the latter would register differently from the original test. Ordinarily the yield-point will be lowered, and the elongation decreased. The best gas-piping material has been found changed by continued service in places exposed to hot gases, such as in the vicinity of a furnace or the heating plant of a residence or other building. Of recent years, therefore, gas engineers have given more attention to the inspection and testing of gas-pipe and gas-pipe fixtures from this standpoint. The deterioration can be easily traced by proper inspection, and probably be rectified. If the deterioration is permitted to continue, defects are liable to be produced in the piping system which may result in a gas explosion. The fire insurance companies now have special inspection agents in their service to locate lurking dangers of fire or explosion in gas-pipe fixtures; and the gas engineer and pipe-fitter are obliged to be quite alert.

In making inspections for defects in the pipes or fixtures, the conditions of the surroundings should be taken into consideration. If the parts have been exposed, in places, to influences which tend to change the structural tests of the metals, those parts should be examined for flaws or tested for weak places. In one test recently, the pipes were jacked to the walls of an ice-making plant, in which there were constant fumes from the acids used in the process of making artificial ice. The jacks for running the pipe along the wall were made from a metallic mixture—about 10 per cent. alloy, which, under ordinary circumstances, would answer all purposes. Some of these jacks were cracked at the shoulder, as shown at A, fig. 1, and threatened to let the pipe drop. A test of the metal in these jacks proved that it had changed to a very brittle state. A remedy was found by removing the jacks, and cutting out a groove, as shown at B, fig. 2, in the shoulder of each, by blocking the jack in a lathe, and doing the cutting with a steel cutter. Then brass rings C were made and expanded, and slipped over the head of the shoulders into the groove of each. These rings served to hold the cracked flanges tight, and strengthen the others.

Processes of bending gas-piping are varied; but the simple form in fig. 3 is useful for general work. This type of bender is made of a wooden round block D, fixed to a base-piece as shown. Then a stand-piece E is set up at the back of the block, and provided with a series of holes and a pin F. The piece which is required for bending is filled with rosin, or similar substance, and one end is placed under the pin, and the other bent over the

Fig. 1.

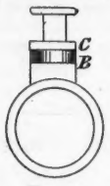


Fig. 2.

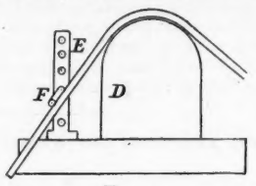


Fig. 3.

block by hand pressure. This process does not require any heating of the pipe; and if the latter is well packed, there will be no danger of the shell collapsing or buckling. If the pipe wall does collapse through lack of packing, a pinhole may be bored in the wall over the depressed place, a hooked rod inserted, and the wall drawn into place. Then the hole can be plugged.

The spiral spring method of bending consists in winding a steel or brass spring the diameter of the interior of the pipe to be bent. This may be done by winding the wire on a steel rod of proper size. Then the wire spring is pushed into the pipe, and the latter bent over a form. If properly done, the pipe can be bent to any angle without buckling. A good type of device to use in connection with this process of bending is presented in fig. 4. The platform A is provided with a stand B, at the top of which is a stud for receiving the iron wheel which is grooved. A pin is set up at C, and after the spiral spring is pushed into the pipe the latter is placed with one end over the pin, while pressure is applied to the other over the grooved wheel, as shown. Fig. 5 shows the same form of bending device used in connection with a clay-filled pipe. If the pipe is not very heavy, clay or putty can be used to advantage. The clay is simply packed into the pipe as hard as possible, and the bending done as before. Hot bending is carried out to a considerable extent; but the danger of injuring the metal by overheating is so great that the cold bending processes are preferred by many engineers.

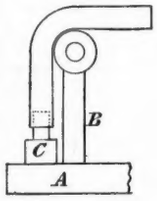


Fig. 4.

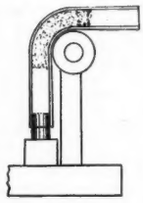


Fig. 5.

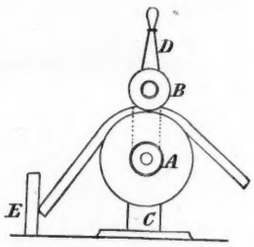


Fig. 6.

In fig. 6 is shown a home-made wheel and lever gas-pipe bender, which can be constructed by any gas-pipe fitter with few tools and parts. The main wheel A should be about 10 inches in diameter, and grooved to about the average size of the pipes handled. The smaller wheel is pivoted at B, just over the larger wheel, and its groove corresponds with the groove of the latter, which is studded firmly to the upright C, to which is also pivoted the lever D. The piece of pipe to be bent is placed between the grooves of these wheels, and with one end of the pipe against the pin E, the other end is bent round the wheel to the desired angle by bringing down the lever.

The top sections of air-valves are usually so freely cut with threads that it is difficult to handle them. In fig. 7 is a little home-made device invented for this work. It consists of a ring of wrought iron secured to a washer F, which is headed to a section of threaded pipe of the size used in the average air-valve. When desiring to elevate the top from an air-valve, instead of injuring the threads by crude tools, the cover is merely unscrewed, this little device screwed into place, and the top lifted by means of the ring.

Gas engineers are often troubled by the flanges of gas-mains shifting slightly, even when secured with apparently firm flange-bolts and connections. There are certain influences that will cause the best-designed flange connection to move, and perhaps result in leakage. In fig. 8 is a style of cutting out the faces of the flanges of the pipe-joint at H H, into which a ring is placed, key-fashioned for preventing shifting. This process consists in cutting a groove round the face of each flange, which is easily done in any lathe by securing the section of pipe to the bed-plate, and revolving it on a cylinder, or by securing the pipe stationary to the bed, and slotting the groove with a cutting-tool turned in the face-plate. After the groove is cut in each flange, a corresponding ring is made, and slipped in as the flanges are closed. After bolting and packing the joint, the connection becomes very secure, and can withstand excessive vibration, accompanied by mechanical strains and various mechanical movements, without working loose.

In fig. 9 is shown a good way of stopping a troublesome little pinhole leak in a gas-main. It calls for a forged iron clamp to fit over the pipe, and bolted at B. This clamp is provided with an extension at A, into which the set-screw D is tapped. Supposing the leak is at E, the clamp is adjusted so that the tip of the set-screw will point directly to the leak, over which is first placed a soft metal washer, topped with a hard metal one.

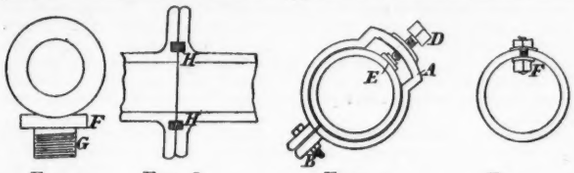


FIG. 7. FIG. 8. FIG. 9. FIG. 10.

The point of the set-screw is now brought down upon the latter, and the soft washer is forced firmly to the leak, effectually stopping it. If the interior of the pipe can be reached, it is a good plan to drill out the ragged leak to receive a common bolt, as shown at F in fig. 10. This bolt is fitted with the proper equipment of rubber and metal washers, to allow the leak to be closed by compressing the washers on the pipe shell by tightening the nut.

Municipal Trading.—In the House of Commons, on the 30th ult., Mr. Balfour was unable to hold out any prospect of the above subject being considered by a Parliamentary Committee this session; but on Monday last week he expressed the hope that the Government would be able to appoint a Committee soon after the meeting of Parliament next year.

A Fireproof Building Material.—A demonstration was recently given of the qualities of a fire-resisting building material called "scagliol," which has been in use in Germany for some years and is now being introduced into England. It is described as a mixture of plaster of Paris, slaked lime, and other ingredients, subjected to a complex chemical treatment; sand, coal ash, or other similar materials, being afterwards added. It is claimed to be fire resisting and sound proof, neither weighty nor bulky, and to be considerably less in cost than ordinary plastered brickwork. To demonstrate the first-named quality of the material, a fire of 3 cwt. of wood, soaked in paraffin, was arranged in a small room built entirely of "scagliol;" the outside walls being 4 inches, and an inner partition 3 inches thick. The temperature in the room rose to about 2000° Fahr., as measured by a pyrometer; yet a thermometer hanging on the other side of the 3-inch partition did not rise above 78°. The structure was only superficially affected by the fire.

Augmenting the Delivery of Gravitation Mains.—At the recent meeting of the Association of Municipal and County Engineers at Cardiff, Mr. J. B. Wilson, of Cockermouth, contributed a short paper on a suggested means for augmenting the flow and delivery of gravitation mains. He said that water-mains, to meet the present requirements of the public, must have a constant and steady flow of water through them, quite free from shocks or pulsation. To comply with these conditions, two kinds of pumps appeared to excel all others in value—centrifugal pumps and screw propellers—both of which might be driven by means of a hydraulic motor, deriving its power from the compensation water or from an extraneous source, as might be found most suitable. In either case, the pump was fixed direct on the main at the most convenient point; the intake-pipe acting as the suction, and the service main acting as the rising main. By this means, with suitable gearing, an increased head could be obtained; the pump having simply to overcome the friction induced by the augmented velocity due to the head at which the pump was driven. The advantages claimed for this scheme were economy of first cost and an economical working expense, with a maximum delivering power.

Depreciation in Machinery.—Mr. Joseph Nasmith discusses this subject in "Cassier's Magazine" for the present month. He points out that in fixing the amount set aside for depreciation, we are at once met with a difficulty which has given rise to much contention. Shall the fixed amount be deducted yearly from the original or from the depreciated value? In other words, shall the life of the machine be taken as the period during which its cost shall be provided for, or shall there be at the expiration of that time a residual value which is equivalent to an extended life? It is quite certain that every machine which is replaced has some residual value. Generally speaking, however, the amount is not large, and may, in any case, be allowed for in making the calculation of the yearly allowance. Mr. Nasmith thinks it may be fairly argued that the plan of deducting equal yearly instalments tells very heavily when the machine is worn and is less effective; while the deduction of a diminishing yearly sum depreciates sufficiently at the beginning, when the machine is at its best, and less after its working value is decreased. While this is true, it is purely a matter of account; and it is permissible to adopt the plan named only when the residual value at the expiration of the fixed period is equal to that of the material. On the whole it is better, in his opinion, and simpler, considering the purpose of depreciation, to deduct annually a fixed sum from the original cost, so that there may be some period when the account will close.

REGISTER OF PATENTS.

Water-Meters.—James, R. W.; a communication from C. T. Moulan, of Brussels. No. 10,435; May 6, 1898.

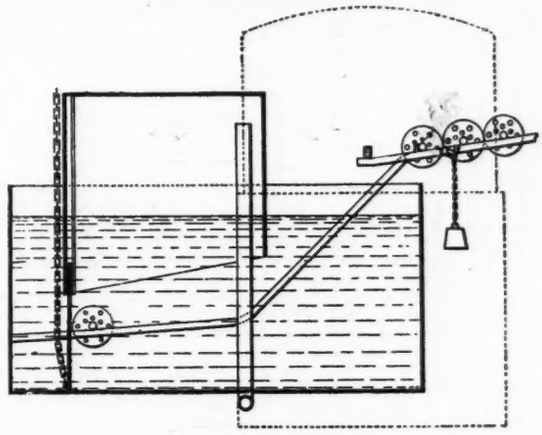
This apparatus for the automatic registration of volumes of water consists of means for the mechanical or electrical transmission of the velocity of movement of a rotary or reciprocating water-meter (inserted into the main-pipe or into a branch-pipe, according as to whether the measurement is to be absolute or relative) to the axle of a cam, so that by the even lifting of a lever carrying a pencil during a revolution of the cam, and the sudden return thereof to the point of starting, the pencil indicates graphically on a drum operated by clockwork, the volumes passed through or consumed in the service. In combination with this arrangement, there is a counter-load valve (to counteract any slight flow), arranged so that when the valve is open the motor runs at the real minimum pressure, which is equal to, or greater than, the weight of the valve and its load.

Manufacture of Acetylene.—Fowler, T. R., of Seacombe. No. 11,377; May 19, 1898.

The main features of this apparatus resemble those described in a former patent granted to the same inventor—No. 14,742 of 1897; and the objects aimed at are "to improve the construction, and to render the devices more certain and smooth in action." The apparatus consists of a combination of two generators, each having a water-inlet, gas-exit, and drain-cocks, so connected together as to be simultaneously operated by a common handle; the water-inlet cocks of the pair being also connected together in such manner that the act of closing either of them will open the other.

Acetylene Generator.—Thompson, W. P.; a communication from the Gesellschaft für Heiz und Beleuchtung-wesen, of Heilbronn, Germany. No. 12,250; May 31, 1898.

The generator, as shown, is connected to the gasholder bell, underneath which rails are arranged, which start from the exterior of the generator, and lead with a somewhat sharp incline down into the water in the generator. On these rails, carbide "cartridges" run. The detent device for the cartridges consists of a pivoted lever having two stops on it, and a counterpoise which tends to keep the lever in a



position to place its stop in front of the trunnion of the first cartridge. The gasholder bell is provided with a contact-bar, which, when the bell sinks below a certain level, comes into contact with the end of the lever, depressing it against the action of its counterpoise, and withdrawing the stop from the trunnion of the first cartridge so as to allow it to roll down the rails into the water in the generator and develop acetylene. Simultaneously, through the movement of the lever, the second stop is moved upwardly into the path of the trunnion of the second cartridge, and prevents more than one cartridge passing into the water at the same time.

The cartridges consist of a casing filled with calcium carbide, and provided with perforations or suitable orifices to enable the water to penetrate to the carbide.

Glow-Bodies for Incandescent Gas-Burners.—Kohl, G., of Vienna. No. 15,957; July 21, 1898.

The patentee claims the "manufacture of durable and elastic glow-bodies of great illuminating power," for a process which he thus describes: First, a solution is prepared by dissolving, in 1 kilogramme of water, 2 grammes of zinc nitrate, 1·2 grammes of tin nitrate, 1 gramme of bismuth nitrate, 1 gramme of borax, and 2 grammes of calcium nitrate. With this solution are impregnated nets or mantles produced from vegetable fibre—preferably cotton or ramie. After being dried at a high temperature, they are impregnated by immersion in a second solution, produced by dissolving, in 1 kilogramme of water, 400 grammes of thorium nitrate, 2 grammes of cerium nitrate (free from didymium), 0·4 gramme of barium nitrate, 3·2 grammes of strontium nitrate, 0·12 gramme of indium nitrate, 0·04 gramme of gallium nitrate, and 0·24 gramme of samarium nitrate. The mantles prepared after this manner are again rapidly dried, and finally "glowed" for the purpose of incinerating the vegetable fibre and the absorbed impregnating salts. In the "glowing," of course, the salts of zinc, tin, and bismuth present with the salts of the rare earths are also incinerated—that is to say, converted into the corresponding oxides—and remain behind as such, and consequently serve to increase the mass of the skeleton of the glow-bodies under consideration, "in consequence of which the skeleton constitutes a much stronger and more fire-proof framework than the glow-bodies heretofore known." The addition of the nitrates of barium, strontium, indium, gallium, and samarium to those of thorium and cerium, has the result (it is said) that the capacity of the new glow

bodies for emitting light is considerably increased, and is maintained constant, while the calcium salt which remains behind in the form of lime after the glowing, and the borax, serve as binding agents.

Gas-Regulators.—Simmance, J. F., and Abady, J., of Page Street, Westminster. No. 15,083; July 9, 1898.

This invention relates to a regulator in which the point of issue, where the gas is allowed to expand to atmospheric pressure, is at a part of the apparatus connected rigidly to the diaphragm, and moving with it.

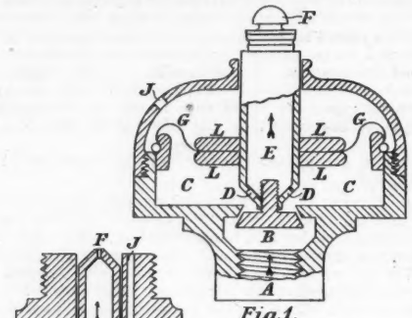


Fig. 1.

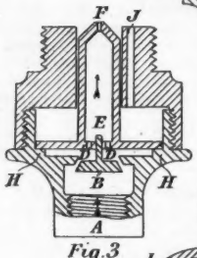


Fig. 3

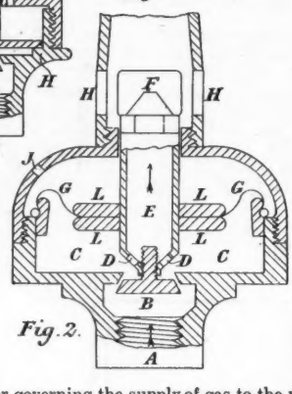


Fig. 2.

Fig. 1 shows a regulator governing the supply of gas to the usual form of steatite flat-flame burner. In action, the gas enters at A, passes round the valve B, and, filling the chamber C, flows through the openings D in the tube E, and out at the steatite burner F. L are discs of lead of any desired weight; and with a given outlet-orifice, they decide the pressure at which the valve and diaphragm lift, and consequently the speed at which the gas issues from the orifice F. Any excess pressure, beyond that required for securing the passage of the desired amount of gas, will cause the diaphragm G to rise, and with it the tube E, to which is rigidly fixed the valve B, which will close the gas supply in proportion to the outlet. The gas issuing from F induces an incurrent of air at the openings H.

Fig 2 shows the invention applied to the bunsen burner of an incandescent gas-light. The action is exactly as in fig. 1, except that the gas is not ignited at the tip F.

Fig. 3 shows an incandescent burner. In this case, the diaphragm (of metal, steatite, or any suitable material) is not fastened to the side of the chamber, but is free to slide up and down in it. It is so fitted as to be gas-tight; but as there is a risk of gas leaking round the periphery, this form of governor can only be used for purposes in which such a leak will not be inconvenient. In action, the gas enters at A, passes round the valve B, and into the chamber formed by the diaphragm resting on the annular ring H. Thence it passes through the openings D, up the tube E, and through the orifice F. J are air-holes.

Incandescent Gas-Mantles.—Kohl, G., of Vienna. No. 15,958; July 21, 1898.

The object of this invention is to strengthen the top of the mantle "so that it will be neither soft nor brittle, but will be as tenacious as possible, and consequently, along with a unique elasticity, will have sufficient strength produced by its tenacity when incinerated."

The method employed for producing this strengthening is to impregnate the mantle with a solution produced by dissolving in 1·5 kilogrammes of water, 300 grammes of aluminium nitrate, 300 grammes of magnesium nitrate, 2 grammes of chromium nitrate, 2 grammes of manganese nitrate, 20 grammes of calcium nitrate, 5 grammes of alum, and 5 grammes of borax. The top of the mantle is only moderately saturated with the solution, and, in the subsequent drying operation, the mantle is hung with the top downwards, for the purpose of preventing the solution from spreading over any considerable portion of the light-emitting surface; otherwise it would diminish the illuminating power. The solution, however, does spread, by suction, in the narrow portion of the mantle next to the head, with the result of producing a gradual merging of the tough strengthened head into the (after incineration) elastic and simple mantle, without affecting its capacity for emitting light.

Gas-Lighting Pellets.—Perl, J., of Berlin. No. 18,932; Sept. 5, 1898.

The patentee declares his object to be "to produce a self-igniting pellet, which shall be impervious to the action of the atmosphere."

He points out that lighting or igniting pellets, which glow in an illuminating-gas stream, are already well known; but to make them practically serviceable for the automatic lighting of gas-flames, the pellets must be so prepared, or must possess the qualities, firstly, that they quickly commence to glow, and, secondly, that they as frequently glow as desired upon the passage of the stream of gas across the pellet. After the discovery was made that finely divided platinum did not fulfil these requirements, it was attempted to increase the effect by mingling the platinum within indifferent porous bodies, according to the suggestion of Liebig ("Poggendorf's Annalen," Vol. 17, 1829, p. 107). Döbereiner ("Journal Praktischer Chemie," Vol. 17, 1839, p. 158) went further in this matter, and produced the finely divided platinum within the pores of natural or artificial meerschaum or clay. The action of the igniting pellets was thus increased; but the problem of causing them to glow quickly, and as often as was required, in the stream of gas was not fulfilled. It was found that the action of the pellet decreased in proportion to the number of times it was used, and that, especially in a damp atmosphere, or after a short period of use, the igniting action entirely ceased.

The reason of this, according to the patentee, is found in the fact that the pellets, in consequence of their peculiar method of manufacture, always contain chloride of magnesium or other earths, because, by the reduction of the platinum salts, which were in the pores of the material employed, a part of the latter is "always transformed by the action of the acids freed from the platinum salts (chiefly hydrochloric acid) to hygroscopic compounds." These compounds are injurious, on account of their hygroscopic properties. They cause the igniting pellet to absorb moisture, in consequence of which, when it is traversed by a flow of gas, the heat generated in the pellet has firstly to evaporate the moisture absorbed by, and now contained in, the pellet before it commences to glow; and so the promptness and speed of the ignition is destroyed.

Furthermore, the compounds act as fluxes, and cause the pellet to become denser and more inpenetrable for the gas, the longer it is in use; so that, usually after a small number of ignitions, it ceases to be further capable of igniting the gas.

The recognition of these facts led to the patentee's "improved process," according to which porous incombustible material is thoroughly mixed with solid or dissolved platinum salts; the mixture dried at a moderate temperature; and the platinum reduced in the pores of the incombustible material, either by bringing the mixture to a high degree of heat in a covered crucible until the hydrochloric acid has disappeared, or else by heating the mass in a reducing gas-flame or in a reducing atmosphere. A pellet results containing hygroscopic salts, which would be extracted by dilute hydrochloric acid, and subsequently with water, until all trace of any soluble salt is removed.

Coke-Conveyor.—West, J., of Manchester. No. 20,580; Sept. 29, 1898.

The conveyor—which was sufficiently illustrated in conjunction with one of the papers read at the last meeting of the Institution of Gas Engineers, see "Journal" for May 23, p. 1354—consists of an endless chain, which travels along the centre of a U or other suitable section of trough; the chain being provided with arms or scrapers which, when drawn along the trough, convey any materials deposited in the trough to any required point, where the materials are discharged through outlets provided in the trough. The object of the invention is: The construction of the arms or scrapers in one piece with the links of the chain; an improved form of slipper or shoe, so designed that, when placed between the side-links forming the chain, it will be held securely in position by projections or lugs cast on the insides of the links; and the provision of a detachable slide-bar in the conveyor-trough, so that when the chain is drawn along the conveyor-trough the wear will be upon the slippers or shoes and the slide-bar in the conveyor-trough—both wearing parts being easily renewed when worn.

Production of Acetylene.—Gossweiller, K., of Heilbronn, Germany. No. 27,252; Dec. 24, 1898.

This process for producing acetylene consists essentially in reducing carbide of calcium to the fluid state before it is treated with the requisite quantity of water for the generation of the gas. The conversion of the carbide into the fluid state is effected by reducing it to powder, and then mixing it with a fluid which does not decompose it—that is to say, the liquid may be capable of dissolving the carbide, but not of generating acetylene. For this purpose, says the patentee, it is advisable to make use of a fluid which possesses the same specific weight as the carbide; so that the powdered carbide will not settle in the fluid, but will remain equally distributed throughout it. It is in this method obviously not necessary that the carbide be reduced to its very finest particles; but it will suffice that it be so far pulverized that it can flow out intermingled with the solvent or suspending medium. The pulverizing of the carbide can be produced by mechanical or chemical means; and a suitable suspending medium would be a mineral oil of specific gravity approximately the same as the carbide.

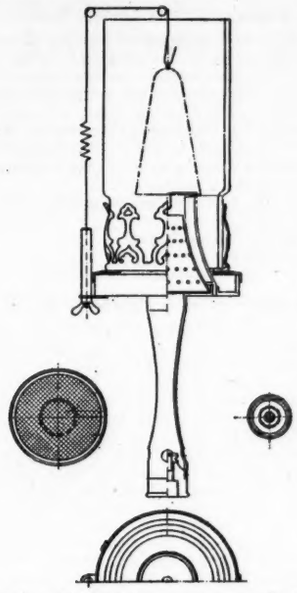
Such a process as this could be applied to any system for generating acetylene; and the carbide liquid could either be caused to fall drop by drop upon the gas-generating fluid, or the gas-generating fluid could be allowed to drip upon the carbide liquid.

Incandescent Gas-Burners.—Conrad, O., of Berlin. No. 7124; April 4, 1899.

The patentee considers that the present style of incandescent gas-burners has the serious drawback that the gas mixture distributes itself throughout the whole of the interior of the mantle, and escapes to a large extent through the meshes of the upper part, without having acted upon the lower part, which is the portion which chiefly radiates light. The purpose of his invention, therefore, is "to conduct the gaseous mixture to the mantle in such manner that it may only escape at the periphery of the burner, and stream along the inside wall of the mantle, while the interior of the burner zone is protected against the entry of gas."

When the burner shown in the engraving is in operation, the gas rushes in at the inlet-nozzle, sucks in air through the apertures shown, and becomes thoroughly mixed with the latter in the long mixing-pipe of peculiar form. The gaseous mixture is then filtered by passing through a wire gauze, and ascends into the bell above; and then again issues through perforations on all sides. The mixture "then rushes to the burner zone, and the current of gas will not then be a central one, but

distributed in the form of a ring." As the shield surrounding the bell directly meets the mantle, "there can be no interruption or deviation of the current of gas, such as hitherto has been the case, so that the part of the mantle adjoining the shield becomes immediately incandescent."



No gas can pass to the middle of the space surrounded by the mantle, so as to stream to the top of the mantle and escape partly or wholly unburnt. On the contrary, all the gaseous mixture which reaches the burner must stream along close to the inside wall of the mantle.

Valves for Water-Gas Generators.—Eissler, M., and Strache, H., of Vienna. No. 7652; April 11, 1899.

According to this invention, a "completely gas-tight and certain closure" of all openings leading to, and away from, water-gas generators, is obtained by employing disc-valves with hydraulic seals, wherein mercury is preferably employed as a sealing liquid on account of the high pressure in the apparatus and the high temperature of the gases drawn off. To prevent evaporation of the sealing liquid, it is preferably cooled by a jacket or casing surrounding the valve, in which there is a cooling liquid. In valves designed for the passage through them of gases carrying flying ashes—such, for example, as exhaust-gas valves—there is, at the same time, provided a space for the deposition of these solids, as well as an opening capable of being closed, and serving for the convenient cleansing of the surface of the sealing liquid.

Fig. 1.

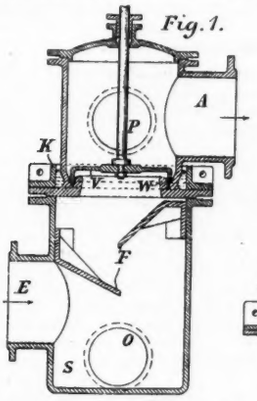


Fig 2

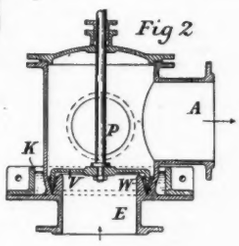


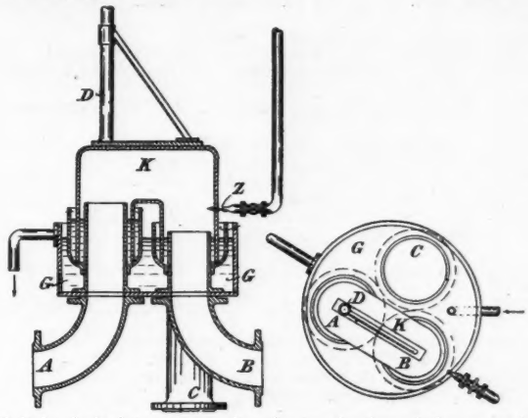
Fig. 1 shows, in vertical section, one form of exhaust-gas valves for water-gas generators. E is the inlet. F are baffle-plates or catch-plates for arresting flying ashes. S is the chamber for collecting the flying ashes, and which can be emptied through a closeable opening O. V is the body of the valve; and W, the cup or annular trough for the sealing liquid. A is the outlet for the gases. P is the opening which serves for cleaning the surface of the sealing liquid. K is the cooling vessel.

Fig. 2 shows a form of secondary air-blast valve. Here the cooling vessel K is only required when hot air is to be blown through the valve.

Change Valve for Water-Gas Generators.—Eissler, M., and Strache, H., of Vienna. No. 7653. April 11, 1899.

This invention relates to a reversing or change-over valve for water-gas generating apparatus (so as to connect the generator alternately with the air-supply pipe and the gas-delivery pipe), wherein the pipe leading to the generator is connected with the air and gas pipes alternately through a U-shaped tube, the limbs of which dip into cups arranged around the several pipes and filled with a sealing liquid.

As shown in the vertical section and plan of the valve, the pipe A is in communication with the generator; the pipe C with the blast-pipe; and the pipe B with the gas-delivery pipe. At the upper end, these pipes are provided with cups or troughs filled with (say) mercury. The connection of the pipe A with one or other of the pipes B or C is made by means of a U-shaped pipe K, the limbs of which dip into the sealing cups of the several pipes, and thus a gas-tight closure is obtained. In the illustration, the pipe A leading to the generator is shown connected with the gas-delivery pipe B.



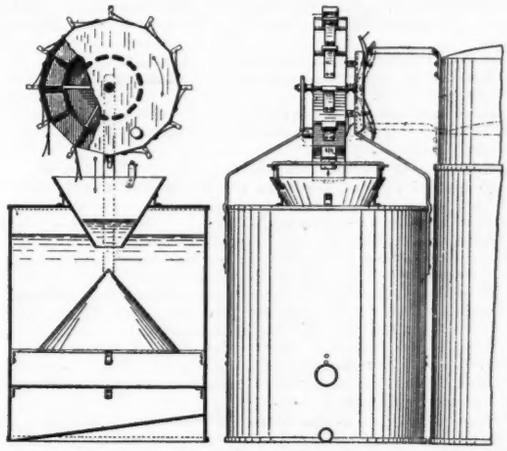
If it be desired to reverse after the termination of the gas-making period, the connecting-pipe K is raised until it passes out of the cup around the pipe B. At this moment, the inner space of the connecting-pipe communicates with the outer air; and the gas contained in the reversing apparatus ignites at the flame Z arranged over the pipe B, filling the whole of the internal space of the apparatus with combustion-gases—carbonic acid, steam, nitrogen, &c.

The connecting-pipe K is now turned about its shaft D (mounted in suitable guides or bearings), and lowered into the annular chamber around the pipe C, thus connecting the generator with the air-blast pipe. If air be now blown in, it is separated from the gas in the generator by a layer of combustion gas; and there will, therefore, first pass into the generator the combustion gases, and only then the air, and thus any explosive mixture of gas and air is avoided.

For cooling the liquid contained in the cups or troughs, they are surrounded by a common receptacle G, through which water circulates.

Generating Acetylene.—Demuth, C., of Zittau, Saxony. No. 7877; April 14, 1899.

In this apparatus for generating acetylene, a carbide drum divided into several compartments is not caused to rotate directly by the rising and falling movements of the gasholder bell (as usual), but there is interposed between the bell and the suitably weighted carbide drum a ratchet mechanism, which causes the carbide drum to move to a certain extent at each rise and fall of the bell. Consequently, the bell has merely to do the work of bringing the ratchet mechanism into the corresponding position.



The carbide drum, resting with its axle in bearings, is loaded with a weight, which is made so heavy as to correspond with the weight of the quantity of carbide contained in one compartment; so that, when the entire drum is filled with carbide, the weight has the tendency of rotating the drum in the direction of the arrow. But the drum is normally prevented from rotating by pins situated in slots of the vessel. These pins are adapted to be shifted in guides; and for this purpose they are connected with a two-armed lever. Against the lever there rests a roller carried by an arm of the gasholder bell. If now the bell moves up and down, the two-armed lever (which is suitably bent) will assume alternately the positions indicated in full lines and dotted lines respectively—the arrangement being such that the pins will enter alternately into the corresponding slot of the carbide drum. When the lower pin enters a slot, while the upper pin is not engaged in the drum, the drum (being acted upon by the weight) will move to the extent allowed by the length of the slot. In this movement, then, a pawl will meet a rod so that the spring of a corresponding lid will be released, and the lid opened. The charge of carbide in the corresponding compartment will then fall into the hopper of the water-vessel, and, on leaving the aperture, is deflected by a stationary cone towards the side of the vessel, in order that the carbide shall not accumulate in the middle. When the weight has moved to such an extent that it has come into its lowest position, it is raised by the charged carbide receptacles to the other side, because the carbide receptacles which are situated on that side have previously been emptied.

APPLICATIONS FOR LETTERS PATENT.

12,761.—Abel, C. D., "Automatic charging apparatus." A communication from A. B. Helbig and the Portland Cement Fabrik Hemmore. June 19.
12,780.—Lehmann, K., "Lamps." June 19.
12,814.—Bartelt, F. L., "Automatic gas-generator." June 20.
12,841.—Boeing, L. O., "Evaporating, concentrating, and condensing towers." June 20.
12,851.—Vivinus, E. A., and Hecht, A. J., "Explosive motors." June 20.
12,854.—Thompson, W. P., "Relief or back-pressure valves." A communication from the Foster Engineering Company. June 20.
12,866.—Lake, H. H., "Explosion engines or motors." A communication from H. B. Steele. June 20.
12,870.—Sugg, W. T., "Compression of gases." June 20.
12,885.—Sales, Count G. de R. de, and Braly, L., "Carburetters." June 20.
12,893.—Matthews, C. R., "Charger for acetylene-gas apparatus." June 21.
12,921.—Snell, C. S. & F. A., "Compressing gas or the like." June 21.
12,922.—Wood, W. R., "Mechanical stokers." June 21.
12,932.—Walker, C. M., "Gas-stove." June 21.
12,938.—Dowson, J. E., "Manufacture of generator gas." June 21.
12,950.—Langhans, R., "Incandescing media for lighting purposes." June 21.
12,986.—Watzl, A., "Gas-engines." June 22.
12,996.—Little, G., "Crushing and screening coke." June 22.
13,009.—Tucker, A., "Valves for fluid mains." June 22.
13,011.—Bond, E. S., "Acetylene lamps." June 22.
13,019.—Rambaud, J., "Gas and like motors." June 22.
13,052.—Sanders, G. F., "Incandescent gas-burners." June 23.
13,053.—Sanders, G. F., "Anti-vibrating springs for incandescent and other lamps." June 23.
13,054.—Sanders, G. F., "Holders for globes and shades of lamps." June 23.
13,079.—Forsyth, J. D. & D., "Generating acetylene gas." June 23.
13,130.—Potter, W. G., "Gas-lamps." June 24.
13,131.—Potter, W. G., "Gas governor or regulator." June 24.
13,132.—Dowle, A. G., "Gas-burner." June 24.
13,140.—Kiesselbach, C., "Separating impurities from steam or gases." June 24.
13,145.—Husson, A., "Acetylene generators." June 24.
13,146.—Dörr, C., "Production of solid materials from tar and other substances." June 24.
13,150.—Marks, H. T., "Acetylene gas-lamp." A communication from W. A. Shearer. June 24.
13,160.—Dowsing, H. J., "Producing and utilizing radiant heat and light." June 24.
13,161.—Reavell, W., and Reavell & Co., Ltd., "Compressing or exhausting fluids." June 24.
13,184.—Lyons, T., "Acetylene generators." June 26.
13,205.—Williams, G. J., and Lewis, E. E., "Gas-engines." June 26.
13,209.—Schäfer, J., "Mantles for incandescent gas-lights." June 26.
13,217.—Depeaux, F. F., "Crushing coke and other minerals." June 26.
13,258.—Rade, B., "Explosive engines." June 27.
13,266.—Young, D., "Gas-engines." A communication from the C. C. Riotte Company. June 27.
13,296.—Richmond, G. H., and Crowther, J., "Stop-valves." June 27.
13,301.—Goldbacher, J. N., and Bournonville, E., "Acetylene gas apparatus." June 27.
13,308.—Müller, A., "Lighting illuminating gas." June 27.
13,310.—Talbot, H., "Lanterns for incandescent gas lighting." June 27.
13,317.—Taite, Howard, and Co., Ltd., and Howard, J. E., "Air and gas compressors." June 27.
13,325.—Schniewind, F. W. C., "Coke-ovens." June 27.
13,335.—Commichau, G., "Conveyors." June 27.
13,339.—Marks, G. C., "Acetylene gas producing apparatus." A communication from the Pauli Lamp Company. June 27.
13,355.—Estill, H. Van W., "Water-meters." June 27.
13,361.—Duncan, J. H. H., "Gas-burners." June 27.
13,401.—Young, F., "Supports for incandescent lamps." June 28.
13,412.—Cole, S. E., "Taps or valves for delivering measured quantities of liquids." June 28.
13,430.—Forbes, Sir C. S., Bart., "Production of acetylene gas." June 28.
13,479.—Percival, E. H., Boutall, H., and Alexander, D. W., "Anti-vibratory springs." June 29.
13,513.—Scott, J. C., and Henderson, J. C., "Using gases for motive power." June 29.
13,550.—Daw, S., "Incandescent gas-mantle carrier." June 30.
13,553.—Wilson, T., "Engines in which steam or other fluid pressure is transmitted from cylinder to cylinder to be used expansively." June 30.
13,556.—Perlich, A., "Self-igniting gas-burner." June 30.
13,570.—M'Innerney, B., "Gas-engine igniters." June 30.
13,572.—Melhuish, J. B., "Generation of acetylene." June 30.
13,573.—Woodhouse, S. J., "Cements for gas-retorts." June 30.
13,588.—Lake, H. H., "Explosion engines." A communication from L. M. Foster. June 30.
13,597.—Scott, J. C., and Henderson, J. C., "Using gases for motive power." June 30.
13,611.—Clercq., C. de, "Explosion engines." June 30.
13,613.—Archer, D. J., "Automatic gas-lighters." June 30.
13,629.—Smethurst, R. S., "Anti-vibrators." July 1.
13,662.—Clarke, J. H., Sprott, E. W., and Acetylite, Ltd., "Acetylene gas generating apparatus." July 1.
13,668.—Fricker, G. C., "Generating combustible gases for motive power purposes." July 1.
13,674.—Greyson de Schodt, P., "Apparatus for use in incandescent gas lighting and heating." July 1.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

A Disclaimer from Colonel Makins.

Sir,—In your last issue, you make an implied charge against me of foul play in having described your "Journal" to Sir James Rankin's Committee as "Mr. Livesey's organ," on the ground that I desired it should be thought that he had a pecuniary interest in your periodical.

I desire to say that no such idea was present to my mind. I simply spoke of the "Journal" as Mr. Livesey's organ in the same way that the "Daily News" was held to be Mr. Gladstone's organ, and the "Standard," Mr. Disraeli's organ, as their policy and utterances inspired the articles published in those newspapers.

I do not think that Mr. Livesey himself would consider me capable of "hitting below the belt."

W. T. Makins.

Rotherfield Court, Henley-on-Thames,
July 8, 1899.

Experience with Hydraulic Mains.

Sir,—I should like to say, in reply to Mr. Carpenter's letter in your last issue, that in no part of my paper or my reply to the discussion did I ever make the suggestion "that the gas entering the hydraulic main is hottest towards the end of the charge." I was somewhat surprised at the tendency, in the course of the discussion, to deal with incidental detail, and ignore the main issues; but when an Engineer of Mr. Carpenter's standing and judgment can come to such a conclusion after going through the paper in the quiet of his study or office, it makes me think I must have expressed myself very badly indeed.

My purpose was to draw special attention to the chemical action of the hydraulic main. As a physical contrivance, I stated that the old form of main was the best; and by the "old form" I mean all forms of main where a tar seal is in use. Of this class of main, there cannot be a doubt that Mr. Livesey's form is the best, because, there being so little room for accumulation, the tar is obliged to get out of the hydraulic, immediately after formation, at a time when it possesses its highest degree of liquidity. It is an eloquent testimonial to Mr. Livesey to say that he had, at so early a date as 1872, arrived at the very best physical contrivance for the purpose. Mr. Livesey, however, advanced a theory, in explanation of the working of his appliance, as all inventors will do; and it was with his theory that I was more particularly concerned. Although I agreed with his data, I disagreed with his conclusions. My reasons for so doing are fully explained in the paper, and need not be repeated here. Had it not been that Mr. Carpenter reiterates the theory without any attempt at demonstration, and without seeming to grasp its full significance, I should not again have alluded to it. The gases at any of the temperatures mentioned in his table after the first hour will give up freely of the hydrocarbon vapours contained therein to the tar, if the tar be not already surcharged; and at none of the temperatures are they capable of detracting from the heavy oils or pitch.

I have not the slightest doubt that all Mr. Carpenter says is true with regard to the working of this particular hydraulic main. What I am curious to know is the quality of the gas produced under these conditions, and also the quality of the tar. I rather think, were I a tar distiller, I should like to buy his tar.

W. Carr.

Stalybridge, July 7, 1899.

Birkdale and the Southport Gas Supply.—The members of the Birkdale District Council last Tuesday had their attention drawn by Mr. W. H. Davey to the fact that the Southport Corporation last year made a clear profit of £3500 on the gas supply; and it had been suggested to reduce the Southport rate 3d. in the pound in consequence. Now Birkdale had contributed largely to this profit; and he thought it only fair that the Corporation should do something to reduce the price of the gas supplied to Birkdale. Southport made a lot of the fact that they paid to Birkdale £2000 as rebate yearly; but this was for the privilege of using the Birkdale mains and the right of supplying them with gas. They were paying more for gas than the Southport consumers; and the sooner they introduced the electric light the better. Mr. Clinning stated that complaints about the quality of the gas had been made even in Southport; and the tests made at Birkdale showed a variation in quality from 13 to nearly 19 candle power. A letter was also read on the same subject from an influential ratepayer, who wanted to know how long the Council intended to allow this "Kruger-like" treatment to continue. No resolutions were proposed.

Sales of Shares.—At the Mart, Tokenhouse Yard, last Wednesday' Mr. Alfred Richards sold £5000 of ordinary stock of the Guildford Gas Company, ranking for a standard dividend of 5 per cent. per annum, subject to the sliding-scale, at practically £120 per £100 of stock; only five lots being secured at 10s. less. A small parcel of £100 of consolidated ordinary 5 per cent. stock of the Enfield Gas Company fetched £113, and £75 of 5 per cent. preference stock £115 per £100, in each case *cum div.* "C" capital stock of the Watford Gas Company (last dividend 9 per cent. per annum) to the amount of £3500 was next offered, and was sold at the rate of £201 per £100, and of £50 10s. and £51 per £25 of stock. A few £10 shares in the Gas-Meter Company, Limited, fetched £28 apiece, *cum div.* On the previous day, at Chatham, Messrs. Kidwell and Son sold 23 lots of "A," "B," and "D" shares in the Rochester, Chatham, and Strood Gas Company. The "A" shares (£50) realized £127, £127 10s., and £128 each; the "B" shares (£12 10s.), carrying 7 per cent. dividend, fetched £21 15s. and £22 apiece; and the "D" shares, on which the dividend paid has been 10 per cent., £22 10s. and £22 15s. per share. At Cambridge, last Wednesday, Messrs. Wright and Scruby sold £600 of consolidated 1897 stock (7 per cent.) of the Cambridge Gas Company at prices ranging from £160 to £167 per £100; a parcel of £50 of the stock going for £82 10s. Four annuities of the Perth Gas Commission, of £16 17s. 6d., £14 7s. 6d., £12 10s., and £5 12s. 6d., were sold by auction in Perth last Thursday for £1629 17s. 6d., which is equal to 33 years' purchase.

PARLIAMENTARY INTELLIGENCE.

Gleanings from the Committee Rooms.

The public sittings of the Committee on the Powers of Charge of the London Gas Companies were brought to a close on Tuesday afternoon; and now many will wait with an uneasy anxiety for their report. Altogether, the Committee have held thirteen sittings for the reception of evidence, and twelve witnesses have been examined. Mr. J. W. Field, as was fairly his right, had the last word on behalf of The Gaslight and Coke Company; but towards the end he seemed to resent the somewhat sharp and critical manner in which Mr. Lough, one of the members of the Committee, dealt with him. A London Gas Engineer was heard to remark, by way of comment on the skilful tussle between the witness and his examiner: "There is little 'Lough' lost between those two." Those who were within ear-shot gasped for fresh air.

There was an abominable waste of time last week in Committee-Room No. 5 over the Lea Bridge Gas Bill; and the responsibility for it rests with the opposing authorities. It was a Commons Committee who had the measure under consideration; and the Chairman was the painstaking Sir William Houldsworth, whose cute comprehension of the points raised was quite a refreshing feature in the otherwise, for the most part, dreary proceedings. In his desire, however, to hear all that could be said, he allowed the opponents plenty of latitude; but the wonder is that he and his colleagues did not lose all patience in listening to the feeble prattle, called by courtesy "local evidence," which went on for hours for the purpose of trying to persuade them that the Company had shown incompetence in performing their duties, and that Parliament could not do better than entrust those duties to the Local Authorities. But if the gentry who were called to uphold these views were representative of those who manage the local affairs of the Leyton and Walthamstow districts, then all we can say is that the Commons Committee have shown their wisdom in refusing to deliver the gas consumers into such control. The burden of the complaint of these local leading-lights was "bad gas." But most of them had not used gas for years in their own domiciles; and, in their simple-minded ignorance, they based the charge of "bad gas" on the optical tests which they had applied to the street-lamps. Confessedly the streets are wretchedly illuminated; and, without a second thought, they cast the entire blame for this at the doors of the Gas Company. Such an idea as the Local Authorities themselves being in fault never once crossed their intelligent minds. That the feebleness of the illumination might be attributed to the burners being rated to consume only 4 cubic feet of 14 or 15 candle gas per hour, and to the lamps being placed from 70 to 98 yards apart, was a suggestion which their superior knowledge would not permit them to concede. And that defective and old-fashioned fittings might account for complaints emanating from private consumers was another proposition which was received with equal scorn. The stubbornness of the stand made was all the more remarkable in face of a report of the opponents' own Gas Examiner, which, in a long list of returns, only presented two fractional deficiencies of illuminating power. The comment of the Chairman that accidents would occur in the best conducted works showed his practical appreciation of the difficulties which beset manufacturers of such a commodity as gas; and the manner in which he interrogated the lay witnesses on the subject of illuminating power and purity, clearly demonstrated the little value that, in view of the Gas Examiner's report, he placed upon their opinions in these respects.

The course which the Company would take when the Bill came before the Commons Committee in reference to the reduction of 6d. made by the Lords Committee in the standard price as fixed in 1878 has been awaited with more than ordinary interest, and many will be disappointed that there was not a fight over this matter, and some effort made to secure a restoration to the original figure. The Company have no doubt been advised by clever Counsel as to what was best to be done in their own interests. Under their particular circumstances, they may not suffer much; but a precedent, which will be mischievous in its more general application, has been established and allowed to go unchallenged. The difficulties which have to be encountered by gas companies in piloting their Bills through Parliament are already formidable enough; but this adds another danger which will have to be calculated upon in approaching Parliament for an extension of powers. Further than this, it creates a flaw in the financial stability of gas companies which it will be hard to efface. The mischief, however, has been done; and it is now too late to undo it. So "freedom slowly broadens down from precedent to precedent." Mr. Baggallay's opening speech as reported in another column is worth reading, as it throws more light on Lord Camperdown's action in this connection.

In summing up the case for the opponents, Mr. Pembroke Stephens sought the rejection of the Bill or the insertion of a purchase clause; and he cited a number of cases as precedents for such action on the part of Parliamentary Committees. But Mr. Baggallay effectually disposed of these so-called precedents; showing that there was only one instance of a statutory Company having such a clause imposed upon them on the petition of a Local Authority. This was the Redhill and Reigate case; and even in that the Bill was withdrawn. Four whole days were occupied in the consideration of the Lea Bridge Bill; while half the time would have sufficed had it not been for the mass of petty evidence put forward by the opposition. But so far the Company have carried their Bill in the form in which it left the Upper House, though, of course, there may be some minor alterations on the consideration of clauses to-day. The case for the Company was supported by Mr. H. E. Jones, Mr. Joseph Cash, Mr. Richard Sandell (the Secretary), and Mr. F. W. Cross (the Engineer); while Mr. E. H. Stevenson was the expert engaged in opposition.

The petition of the Loughborough Gas Company against the Corporation Gas Bill was withdrawn last Wednesday; and, in consequence, the following day saw the disappearance of the Bill from the group of measures down for consideration by Sir William Houldsworth's Committee. It will be remembered that both the Corporation and the Company introduced Bills in the present session; the former for the purpose of obtaining purchase powers. The House of Lords Committee to whom both measures were first referred allowed that of the Corporation to proceed solely on the ground of "public policy;" and thus for the first time created an unquestionable case of compulsory purchase. It was hoped that the Company would make an energetic stand against this when the Bill came before the Commons Committee; but, in the meantime, the parties have arrived at a settlement. The exact nature of this has not yet transpired; but we are not far wrong in saying that the basis of agreement is something akin to that in the Morecambe case, as noticed in the "JOURNAL" for June 20 last (p. 1671).

The little Bill of the Yeadon and Guiseley Gas Company has had an unhappy experience. About a fortnight before the Whitsun Holidays, it was down for consideration by a Commons Committee in Group J. But the Committee found their labours more onerous than expected; and, having been tied to their work for some time, they were relieved of the Yeadon and one or two other Bills. The Bill was then tacked on to the group of measures referred to Sir William Houldsworth's Committee. Falling next to the Lea Bridge Bill, it was unstarred at the beginning of last week, and so the witnesses had again to be in attendance. On Thursday, the Chairman finding that the proceedings in the Lea Bridge case would be driven over to Friday, dismissed the Yeadon witnesses until to-day. If only as compensation for the trouble they have been put to, the Company deserve success.

Having survived the objection raised by the Notts. County Council on the ground of non-compliance with the Standing Orders of the House of Lords, and having been read a second time in the House, the Derwent Valley Water Bill has been referred to a Committee of Peers, of which the Earl of Lauderdale is Chairman. His Lordship is a member of the Standing Orders Committee, and therefore learnt something of the scope of the Bill when the matter came before the Committee on Monday last week. Moreover, he is an exceedingly painstaking Chairman. As the Bill stands last in the group referred to the Committee, who commence their sittings to-day, it will probably not be reached this week; and although, when it comes on, its consideration may be expected to occupy several days, as certain fresh points are to be raised, the proceedings will not be of the protracted character of those in the Committee of the Lower House.

The Bill by which the Godalming Corporation seek authority to purchase, for the sum of £51,000, the undertaking of the Firth Hill, Godalming, and Farncombe Water Company, Limited, and to supply water throughout the borough of Godalming and adjacent places, came on Tuesday before a Select Committee of the House of Lords presided over by Lord Hawkesbury. Curiously enough, the only opponents of the Bill were twenty shareholders in the Company, who contended that the price was inadequate, and expressed a wish that the undertaking should be sold on arbitration terms. In their petition, they alleged that the resolution to sell was rejected by 22 votes to 28; but notwithstanding this, the Directors entered into an agreement with the Corporation. This, however, was subsequently rejected by 23 shareholders, representing 312 votes, to 38 shareholders, representing 640 votes. They pointed out that, under the Companies Acts and the Standing Orders of the House, a statutory majority of three-fourths is required to sanction a sale, and that therefore the Company were attempting to override a Public Act by private legislation. But Mr. J. Mansergh expressed the opinion that the terms offered were fair to all parties. He said he did not see any advantage to be gained—except to the engineering profession—by going to arbitration, which would not only cause delay but waste of money. Mr. Courthope Monroe, who appeared for the Company to oppose any alteration in the Bill, having told their Lordships that the Committee of the Lower House had full knowledge of the facts of the case before they decided to pass the preamble, the Bill was allowed to proceed. It now remains to be seen what the Corporation will do; and this can only be learnt after their meeting next Monday. It is thought by some of the ratepayers that the purchase of the undertaking will not be productive of any material benefit to the town, at all events for some years to come.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Standing Orders dispensed with: Derwent Valley Water Bill.

Bill brought from the Commons, read the first time, and referred to the Examiners: Warrington Corporation Bill.

Bills read a second time and committed: Derwent Valley Water Bill, Stockport Corporation Bill.

Bills reported: Ayr Borough Bill, Birmingham Corporation Bill, Blackpool Improvement Bill, Goole Urban District Council Bill, Local Government Provisional Orders (Gas) Bill, Woking Water and Gas Bill.

Bills read the third time and passed: Gas Orders Confirmation (No. 2) Bill, Local Government Provisional Orders (Gas) Bill, Scunthorpe Urban District Gas and Water Bill, West Gloucestershire Water Bill.

The Derwent Valley Water Bill has been referred to a Select Committee, consisting of the Earl of Lauderdale (Chairman), the Earl of Abingdon, the Earl of Mayo, Lord Llangattock, and Lord Monk Bretton; to meet on Tuesday, July 11.

The Bradford Tramways and Improvement Bill has been referred to a Select Committee, consisting of Earl Egerton (Chairman), the Earl of Malmesbury, Earl Craven, Lord Bagot, and Lord Wandsworth; to meet on Tuesday, July 11.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read the first time, and referred to the Examiners: Gas Orders Confirmation Bill (No. 2), Workington Corporation Bill.

Lords Bills read a second time and committed: Gas Orders Confirmation Bill (No. 1), Gas and Water Orders Confirmation Bill, Water Orders Confirmation Bill.

Bill reported, with amendments: South Hants Water Bill.

Bills read the third time and passed: Bury Corporation Bill [Lords], Bury Corporation Water Bill [Lords], Church Stretton Water Bill [Lords], Cobham Gas Bill [Lords], St. Neots Water Bill [Lords], Stretford Gas Bill [Lords], Warrington Corporation Bill.

The Loughborough Gas Company have withdrawn their petition against the Loughborough Corporation Bill [Lords].

HOUSE OF COMMONS SELECT COMMITTEE.

Tuesday, July 4.

(*Sir* James Rankin, *Chairman.*)

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES.

The Select Committee of the House of Commons on the above subject met again to-day.

Mr. John W. Field *was recalled.*

He said he had been asked on a former occasion to give figures of the electric light competition for some period earlier than last year. In 1893, the Electric Lighting Companies in the Gaslight Company's district sold 10,640,000 units, representing 1064 million cubic feet of gas. In 1898, the quantity of electricity sold represented about 3000 millions of gas. Another question which had been put was as to whether his Company had anything in the shape of a Shop Club. The term was somewhat new; but on inquiry, he found that they had a Workmen's Provident Club, to which nearly all the men—8000 out of 12,000—subscribed. Then he had been asked whether Mr. Livesey exported coke. His reply was that he did, but that he (witness) did not know the quantity. One of the Directors of the South Metropolitan Company who was sitting behind him when he made the statement, contradicted him. Witness was rather surprised to hear that, because he had received the information from one of the contractors. He therefore wrote to the contractor, who replied that he had bought coke on various occasions at the South Metropolitan wharf for export, but had had to give it up because they found the quality unsuitable for the Continental market. Further on in his evidence, witness stated that other Companies had not obtained a better price for residuals than The Gaslight and Coke Company. He now handed in the following table, giving the receipts of all the Metropoliton Companies per ton of coal from residual products from 1892 to 1898.

Receipts from Residual Products per Ton of Coal Carbonized by the Metropolitan Companies from 1892 *to* 1898.

	Coke and Breeze.			Tar and Tar Products.			Ammoniacal Liquor, Sulphate, etc.			Total Residuals.		
	Gaslight.	South Metropolitan.	Commercial.	Gaslight.	South Metropolitan.	Commercial.	Gaslight.	South Metropolitan.	Commercial.	Gaslight.	South Metropolitan.	Commercial.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1892. . . .	4 6·95	5 5·18	4 2·53	1 5·95	1 3·21	1 3·00	1 4·04	1 3·69	1 6·96	7 4·94	8 0·08	7 0·49
1893. . . .	5 1·11	5 11·08	5 8·48	1 5·77	1 0·13	1 4·89	1 5·67	1 7·95	1 11·46	8 0·55	8 7·16	9 0 83
1894. . . .	5 6·72	6 1·30	5 9·38	1 7·18	1 2·29	1 6·14	1 8·63	1 11·45	2 0·37	8 10·53	9 3 04	9 3·89
1895. . . .	5 1·77	5 3·60	4 10·85	1 7·09	1 2·93	1 7·21	1 2·77	1 2·78	1 1·02	7 11·63	7 9·31	7 7·08
1896. . . .	4 0·52	4 8·61	3 9·55	1 6 59	1 1·99	1 5·63	1 0·70	0 11·18	1 0·55	6 7·81	6 9·78	6 3·73
1897. . . .	3 10·73	4 6·28	3 7·36	1 0·47	0 8·25	1 1·56	1 1·22	0 10·32	1 0·12	6 0·42	6 0·85	5 9·04
1898. . . .	4 10 81	5 5·85	5 0·29	1 0·08	0 7·76	1 3·77	1 4·80	1 2·42	1 1 91	7 3·69	7 4·03	7 5·97
1898 over 1892												
Increase. .	0 3·86	0 0·67	0 9·76	..	..	0 0·77	0 0·76	..	..	..	..	0 5·48
Decrease .	..	..	..	0 5·87	0 7·45	..	..	0 1·27	0 5·05	0 1·25	0 8·05	..

This table showed that, as far as coke and breeze were concerned, the Gaslight Company's receipts had increased by 3·86d. in 1898 over 1892; the corresponding figures of increase for the same period with the South Metropolitan being 0·67d., and with the Commercial 9·76d. With tar and tar products, the figures for the same period were: The Gaslight and Coke Company, decrease, 5·87d.; South Metropolitan, decrease, 7·45d.; and Commercial, increase, 0·77d.

Mr. Lough: Can you explain the tremendous difference between the Commercial and South Metropolitan in coke and breeze?

Witness: I think I can explain it in this way: If the hon. member will look at the figure for 1892, he will find the Commercial Company were exceptionally low—4s. 2·53d.; the South Metropolitan figure being 5s. 5·18d. It would therefore appear that the year 1892 was a bad year for the Commercial Company's coke.

Does that not affect all of you?—No.

The Chairman: Your tables show that your prices are lower than those of the South Metropolitan?

Witness: Yes; I think I have fully explained why our coke is lower than theirs—by reason of the want of a local market. In the case of ammoniacal liquor and sulphate, during the whole period we alone have had an increase over 1892; the other two Companies having a slight decrease.

Sir F. Dixon-Hartland: Did you sell at any time coke abroad at less price than you had sold it in England, in order to keep up this competition against English consumers—merchants?

Witness: No.

You did not sell any abroad at a lower price than in England?—No.

The Chairman: Now I think you have got to the point of the meter-rents?

Witness: Mr. Livesey says that when we abolished meter-rents we did not supply free meters. We never professed to do. All we professed to do—and we did it—was to get rid of an exceptional charge which the public generally objected to; and the abolition of these rents was an advantage to the consumers, because Mr. Livesey knows perfectly well that the saving to the consumer carried with it no additional advantage to the shareholders.

What do you put your abolition of meter-rents at?—¾d. per 1000 cubic feet advantage to the consumer.

Witness went on to say that Mr. Livesey complained that before abolishing the rents the Company did not consult him. At the meeting of the Gaslight Company before they were abolished, the Governor stated that the subject was being considered. Mr. Livesey at once rose and said, speaking for the South Metropolitan, he would not abolish the rents; and he went on to state that he thought he could say the same for Mr. Jones of the Commercial Company. After such an expression of opinion as this, the Gaslight Company did not feel inclined to confer with him. They had thought they were quite sure of Mr. Livesey's support in the matter, because in 1874, when giving evidence before the Revision Commissioners, in reply to a question as to why his Company did not charge meter-rents, he said: "We felt they were a very obnoxious and objectionable charge." Mr. Livesey had also referred to the point of supplying the people south of the Thames at the expense of people on the north; but witness had so fully dealt with that this he need not trouble them with it any more.

The Chairman: Just give me the figures again of what you call the cost of production in the south?

Witness: 2s. 4·45d. This includes, as I have explained, the charge for capital, distribution, management, and, in fact, all charges until the gas is paid for by the consumer. This is what it cost in every possible way. Every charge in connection with the supply of gas to the consumer is covered by this price, even to the cost of collecting the debt.

I understand you manufacture a good deal of gas at Nine Elms for the north side?—Yes.

Are you giving credit in this 2s. 4½d. for that?—No; it is purely the gas sold on the south of London, and made at Nine Elms.

My question is: Are you giving credit in your capital charges for that part of the capital at Nine Elms which is occupied in producing gas for the north side?—Yes, because I am simply charging in this 2s. 4½d. the capital employed in making this particular quantity of gas. Against the deficit between the cost of manufacture and price charged last year, the Nine Elms works are entitled to credit for the gas made there and sent to the north of London; but this is quite separate.

So that you are making gas on the south side of London at 2½d. more than you sell it for?—Well, I am dealing throughout with the figure of last year. If this figure of 2s. 4·45d. turned out to be the cost for the current year, you would be quite right. Then Mr. Livesey also raised the question which has been discussed elsewhere, as to the alienation of the southern district. I do not see that the public would gain. The capital has been expended; and if the South Metropolitan took over the works, they could not make gas more cheaply than The Gaslight and Coke Company. But, apart from this, it would be very unfair to The Gaslight and Coke Company to take away part of their district, for the reason that it is one of the increasing portions. Our rate of increase in the last few years has been very small; but the area on the south of the river yields an increase of 7½ per cent., against 2¾ per cent. on the north. Therefore if the district were taken away from us, Parliament would be depriving us of one of our best districts.

How could it be a disadvantage to take that part away from you, if it is worked at a loss?—Because we are able to make more gas there than we can sell at 2s. 2d.

But you are speaking now of the gas which is consumed on the north—which is made in the south and passed over to the north?—Yes.

But I understood your figure—this 2s. 4½d.—referred only to the capital employed in the south, and the gas made in the south, and had nothing to do with the proportion of gas made in the south and consumed in the north?—Quite right.

Then I come back to the same question: How do you think it is profitable to your Company (not to the consumers) to keep a business which you are carrying on at a loss?—Because we can still make a quantity of gas on the south that is not wanted on the south, send it to the north, and sell it at the better price.

Could you not do the same?—No; because the works must follow the district.

You lay that down as a *sine quâ non?*—Yes.

Sir F. Dixon-Hartland: You have stated that the gas costs 2s. 4½d. to make?

Witness: Yes.

Very well, then the more you have to sell at 2s. 2d. the worse it is for the north. You contend that the district is increasing. Therefore you will have to keep selling more at 2s. 2d.?—Yes.

Every 1000 cubic feet more you sell in the south is a loss to the people in the north?—Yes; but——no, no. If we make a larger quantity of gas there, we can certainly make it more cheaply. The retention of the Nine Elms works by the Gaslight Company, if our district south of the Thames was taken from us, is a point on which Mr. Livesey and I have disagreed for years. The objection to taking the works was that new works of a more modern character could be erected more cheaply than the Nine Elms works could be purchased.

Sir F. Dixon-Hartland: The more you increase your sale on the south, the worse it is for the northern district?

Witness: That depends on whether the cost of gas is going to remain the same.

The Chairman: Supposing you had the southern district handed over to the South Metropolitan, and retained your works at Nine Elms, would that be an advantage to your Company?

Witness: No; a distinct disadvantage.

It would be using more capital than you would want for the supply of the north side?—Yes; and we can construct works on a more modern system, and cheaper, down at Beckton.

You said before you could not manufacture gas cheaply at Nine Elms,

and therefore it was an advantage to your Company to retain the works to supply the north?—So long as we have the district.

Would it be more cheap or profitable to your Company to put up new works at Beckton, or retain the old works which you have at Nine Elms and manufacture gas there for the north?—It would be cheaper to construct works and make gas at Beckton for the supply of the north.

Would that not involve new capital?—Yes.

Would that not come back to the price you would get for the sale of the works?—Yes. Mr. Livesey would not consider our proposal years ago; but that is the *crux* of the whole position—what we get for the works.

If you got a fair price for Nine Elms, you would prefer to sell them and put up new works at Beckton?—If the southern district is taken away from us, it would certainly be cheaper for us to put up new works at Beckton.

Mr. COHEN: Would it not be better for you to get, for all the gas you could manufacture at Nine Elms, the price which you can charge in the north—if you were liberated from delivering in the south the portion which is made at the Nine Elms works and consumed in the south?

Witness: Yes; we should get so much more profit.

I do not understand that—being inconsistent with your previous answer to the Chairman—because if you make gas at Nine Elms and have to deliver a portion of the manufacture in the south, where you get a less price, surely it would be advantageous to have all the product of the Nine Elms works delivered in the part of London where you get the higher price?—Yes; that is quite true. But it would be still better for us, if you take away the southern district, to be allowed to construct works at Beckton, and send in to the northern district cheaper gas altogether.

The CHAIRMAN: It all depends on the price you may get, or ought to get, for the works at Nine Elms?

Witness: Yes.

Mr. LOUGH: You said some time ago that, supposing you sold the whole southern district, and had to make arrangements for the manufacture of gas at Beckton, you would require fresh capital for the Beckton works?

Witness: Yes.

Have you forgotten the price you would get for the southern part? Would not this not only enable you to make arrangements for the manufacture at Beckton, but give you something over for capital?—It would be capital itself.

And if anybody wanted to raise fresh capital, it would be the South Metropolitan, to enable them to buy it?—Yes.

Your evidence seems to amount to this—that if you get a fair price, it would be advantageous to you to get rid of the southern district?—If we got a fair price, in consideration of what the district is worth, and the works, it would be an advantage.

Sir F. DIXON-HARTLAND: What is the district worth, making a loss on every cubic foot of gas you sell? What can it be worth?

Witness: You must take the works and the district together; that is my contention. We do not look upon the Nine Elms works and the southern district as separate matters.

I understand you are making gas there at such a price that you can sell it at a profit in the north?—Yes.

Then what is against the principle of the whole of the works being left with you to supply the north, and letting the South Metropolitan supply the district? What is to prevent that? All the profit would then go to the north, instead of the loss?—Yes; that would be even better.

That is not the question. It is better to cut half a loss?—The Company are not making a loss.

The CHAIRMAN: I think you have admitted you are making a loss.

Witness: On the south, but not on the whole undertaking. The Committee must forgive me if I maintain the position of the Company, which is that the district on the south and the works are one and the same thing.

In further examination, witness referred to the advance in wages made to the men, regarding which Mr. Livesey said the notification from the Gaslight Company to the men was too late, with the result that the Gas Workers' Union had all the credit. That was not the fact. The notification was made to the men one Friday night; and they were not astonished, but pleased with it. The fact was that the next morning witness had letters from Mr. Thorne, the Secretary of the Union, dated Friday, applying for an increase in wages. But the ink on the letter was not dry when it reached witness's hands, so he supposed Mr. Thorne wrote after the thing had been done. He maintained that the Gaslight Company paid as good wages as the South Metropolitan. Then Mr. Livesey gave a long list of companies charging 3s. and upwards; and the same thing had been done by Mr. Haward, and one or two other witnesses. Mr. Livesey, however, ought not to have done this, because he knew that many of the Companies were not under the same conditions as the Gaslight Company. Mr. Livesey mentioned some 30 undertakings; but of these witness believed only four supplied 16-candle gas, two of them were tested by their own officers, and seven had to supply only 14-candle gas. It was unfair to make a comparison of prices without considering the illuminating power and the purity of the gas.

The CHAIRMAN: Do you complain of the list showing charges higher than yours?

Witness: I do complain that Mr. Livesey made no reference to a most important fact—the illuminating power. Why he gave the list of companies, I do not know.

Do you wish to say something about amalgamation?—Yes. Mr. Livesey's evidence was to the effect that all these amalgamations had been of very great advantage to the Company, and yet that no one had been any the better for them. He alluded to the City of London Gas Company; but he did not tell the Committee that the amalgamation of that Company involved the abolition of the whole of their works on the Thames Embankment, and that we had to bear this dead capital for many years afterwards. Then he referred to the amalgamation with the Western Company. This Company gave us works which were about the most costly of any of our works—with reference to the supply of coal. These amalgamations were for the benefit of The Gaslight and Coke Company and of the Companies amalgamated, as well as for the benefit of the consumers.

Mr. COHEN: It benefited some more in quality than in price charged?

Witness: No; that is one of the points. Immediately after every amalgamation, the price of gas was reduced.

The CHAIRMAN: I suppose it is not denied that these amalgamations were not only for the benefit of the Companies, but for the benefit of the consumers?

Witness: I think the figures go to show that.

You wish to say something about the rating appeals?—Yes. Mr. Livesey challenges the wisdom of our assessment appeal in 1891. The fact is that upon appeal we got a reduction in our assessment of £41,000; and this meant an annual saving of £11,000. Then he goes on to say that when we were before the Court we fixed the rate at 5 per cent. I do not know what Mr. Livesey means by that. We fixed nothing of the kind. One statement was made on the express instructions of the Chairman of the Sessions; but the other witnesses on behalf of the Company made out their accounts, I think, to an assessment of something like 10 per cent. But whatever the cases put before the Sessions, the fact remains that we did get a very substantial reduction of £41,000; and the annual saving was more than enough to pay the cost of the appeal.

But does Mr. Livesey say you have not made proper efforts on appeal to get your assessment lowered?—No; he says we blundered. I think he calls us stupid people.

You maintain you have done all you can to get your assessment down?—Yes.

And have got your rating as low, do you say, as you can get it?—Yes.

Witness (continuing) stated that in 1895 Mr. Livesey appealed, and had judgment given against him all round; an excessively high assessment of something like 15¾ per cent. being established for a Company charging 2s. 4d. per 1000 cubic feet. Mr. Livesey did not come off quite so well as the Gaslight Company, whom he charged with blundering in this matter, as in everything else.

The CHAIRMAN: Perhaps he was a little over-reaching himself, would you wish to say?

Witness: Well, I think he would have done better to have settled the matter quietly, without going to Court. That is what we did in 1895.

You maintain, however, that your Company, upon the whole undertaking, is rated higher in proportion than the South Metropolitan, to an extent which equals 1d. per 1000 cubic feet?—Yes; that is one of the explanations we give of the differences between our charges.

Passing on, witness referred to the statement of Mr. Livesey that the competition of electricity with gas in the Gaslight Company's area was so powerful by reason of the high price charged for gas. If the electric light had been adopted because it was cheaper than gas, it would have been taken up in the poor as well as the rich districts; but they found it was only used by those who could afford to pay a higher price. He altogether disagreed with Mr. Livesey's observations on this point. The Governor of the Company dealt so fully with Mr. Livesey's proposed remedy for the position of the Gaslight Company, that witness would not trouble the Committee further on the subject. He pointed out, however, that the proposed remedy amounted really to a fine on the Company of £3,000,000, and would be a serious breach of faith with the persons who had subscribed to the capital of the Company. Although Mr. Livesey advocated this remedy, he had himself said he did not think Parliament could revoke the standard price in the Metropolis. Then Mr. Livesey said he wanted the Directors to show the public that they were in earnest in trying to do better; and that the only way they could do this was by reducing their dividends. Witness, however, wished to know if a case could be found in which the Directors of a Gas Company had voluntarily given up half-a-million of money, which they held in reserve, simply for the purpose of keeping down the price. He did not know of any case; and if this was not a sufficient earnest to the public, he did not know what more his Directors could do.

Mr. COHEN: You say, given up half-a-million of money to reduce the price of gas. That was taken from the reserve to distribute among the shareholders as dividend?

Witness: No; the half-million is divided into two parts—five-sixths to the consumers, and one-sixth to the shareholders. If we had not used the money, we should have had to raise the price of gas.

Sir F. DIXON-HARTLAND: Why?

Witness: Because we could not have paid our way. The Committee must not think that the half-million pounds went into the pockets of the shareholders. It simply staved off the raising of the price of gas.

The CHAIRMAN: Order, order. We have had all that out; we cannot go back upon it. Do you wish to say anything in the way of summary?—No; I should be travelling over the same ground.

Witness was then cross-examined by members of the Committee.

Mr. COHEN: I understand you to say that the amalgamations, while no doubt in favour of your Company, have operated to the benefit of the consumers?

Witness: Yes.

Because the price of gas fell?—Yes.

Mr. COHEN then put a long question as to whether the great fall in coals did not take place since the amalgamations. The fall in the price of gas might be *post hoc* or *propter hoc*. Mr. Livesey said, in his opinion, the inhabitants north of the Thames had suffered by the amalgamation, and he supported this by reference to the Commercial Gas Company. There were other Companies—the London, for instance—who if they had continued, Mr. Livesey said, would have been selling gas as cheaply as the Commercial.

Witness assented.

Mr. COHEN: Can you explain that?

Witness: The same thing can be said of the amalgamations south of the river. May I refer to one table put in. You will see that the South Metropolitan Company in 1869 had capital to the amount of 10s. 3d. per 1000 cubic feet. This capital was only reduced to the extent of 2d. up to the year 1879. The Phœnix Company had capital to the extent of 19s. 8d. in their first year; but in their last year it had come down to 13s. 9d., or a fall of 6s. Therefore there can be no doubt that if the Phœnix Company had gone on by themselves, without amalgamation with the South Metropolitan Company, they would before long have overtaken the latter. I assume that there was an apportionment with regard to this charge. Mr. Livesey and others have talked about the large reserve fund that these outside Companies brought to us; but it must be borne in mind that we have had to pay upwards of £200,000 in commutation of annuities to these Companies.

Explain that. I suppose you mean that when you bought the property you had to give the owners something?—We had to pay the officers of the old Companies. The Companies had liabilities attached to them.

The CHAIRMAN: Those liabilities were part of the price.

Witness: Yes; but this came out of the large fund that Mr. Livesey and others have referred to. It must not be imagined that the large capital these Companies brought to us has gone into the pockets of our shareholders.

Mr. COHEN: You valued their assets and their liabilities?

Witness: Yes; and we took them as going concerns. It must not be thought the surplus balances brought to us were unattached.

You told us that, in making comparisons, we must have regard to the average price of gas?—Yes.

We have by the terms of our reference, to consider the difference between the price of gas on the north and the south sides of the Thames, and it does not seem fair that we should take the average price charged by The Gaslight and Coke Company, instead of exclusively the charge made on the north side. The average price misleads?—I follow you. It is rather a question of the apportionment of price. As regards the apportionment—2s. 2d. on the south side and 3s. on the north—the Company were not responsible for it. It was made by Parliament, or rather the Board of Trade. Therefore if you are going to make a comparison in regard to our charges to the public, I submit that you must take into consideration the whole circumstances of these charges. We only recognize ourselves as one. The division of our price does not divide our body, but is a matter the Board of Trade have to deal with. All we know is that last year what we got was 2s. 10·62d. for every 1000 cubic feet of gas we sold.

We are to find out the difference between the price in the north and south; and in order to do this we must separate the two. We cannot blend them and take the average?—You must recognize the maximum price as being the Government price. That is purely a matter for the Government Department, and not for the Company.

Except in view of the equity of the average, am I not right in saying that the average would be very little affected in your favour? Are not the figures 21,000,000,000 cubic feet of gas supplied by your Company—19,000,000,000 to consumers on the north of the Thames and 1,000,000,000 on the south, with 1,000,000,000 for public lighting?—You are almost correct. We supply for public lighting north of the Thames 19,000,000,000 feet, or almost that amount, 900,000,000 feet south of the Thames, and 1,000,000,000 for public lighting.

Out of the 21,000,000,000 the average would not be much disturbed, because 19,000,000,000 feet are charged for at the highest price?—Yes. Actually the average price is 2s. 10·6d.

I find it difficult to get at the actual state of things as to residuals. Mr. Livesey dwelt on the disastrous results which had ensued from your not selling coke and other residual products when they were manufactured, and about not buying your coal when you required it. I want to know the actual state of things. Do you more or less adopt that practice—which, I believe, you yourself told us you had found to be the best—or do you exercise your judgment and hold back at one time and go forward at another?—No. Our policy is not to stay. The only occasion on which we did so to an extraordinary extent was in connection with the sulphate of ammonia market. We say we had abundant reason to stay on that occasion. It is the only time when we had undue stocks. It would be unwise—indeed, impossible—to adopt Mr. Livesey's theory of selling month by month, because the buyers are very few in number, and are a very autocratic set of men in their way of doing business. They only buy when they like; and any attempt to force the commodity upon them would be to compel the middle-man to take part in the operations.

If you do not find that when you are storing up these products those who deal in them are cognizant that you are doing so, it is an extraordinary thing. People interested in the market are better informed than yourselves. They are aware that you are accumulating a stock, and that it must come on the market. In Stock Exchange matters we generally find that the professional operator knows a great deal more than the amateur?—That is possible; but there are occasions when the ordinary laws cannot apply.

But the policy of holding back stocks did result in disaster to you at one time, or so we have been told. Is it not true that on one occasion you had to sell at £7 per ton when you had refused £13 15s.?—You were told that; but there was not an atom of proof in support of the assertion.

Then you say it that was not the case?—No, it wasnot the case.

Mr. Livesey, I may take it, said one thing and you say the other; that will do?—Well, I have all the figures here.

Never mind going any further into it?—The disastrous loss was simply caused by the reduction of consumption, and the double reason of a large increase in manufacture.

It was not because you asked £14 for that which the would-be buyer offered £13 15s. for that you were unable to effect a sale, and eventually had to take £7 per ton?—No. If we did refuse £13 15s. we, at any rate, got £11 for the material. The prices went down year by year; and we had to sell our make, and not our stock, at that price.

In regard to wages, you represent to us that the difference is due to a great extent to the South Metropolitan Company having more mechanical apparatus than you?—Yes.

Does not that argue a little better provision on the part of the South Metropolitan Company? Have not your arguments been defective in so far as you have gone; you have made use of your old defective plant, and have not adopted new appliances which would have been to the advantage of the consumer?—Yes, to some extent it would have been to the advantage of the consumer to have adopted new plant; but you must not forget that during the whole of this period The Gaslight and Coke Company have been much hampered by heavy capital expenditure. The shareholders have demurred year after year to entering upon new expenditure which was not absolutely required. During the last four or five years we have been carrying out experiments as to stoking in directions which are an improvement on the mechanical stoker.

When you speak of capital expenditure, is not that giving away the case, as that is one of the charges that have been made against you pretty abundantly?—If we had incurred new capital charges, we should still further have given cause for complaint.

All this capital has been incurred in the instalment of old apparatus which has become useless?—No; I do not think that is in evidence.

You had capital charges on a large amount of old fixed plant, which you would have been glad to supersede if it had not been for the incubus of this large accumulated capital?—Yes, we are 90 years old you must remember; and, therefore, we are bound to have a larger proportion of old plant than a newer Company. You must also remember that adoption and reconstruction is not only costly as to capital, but also as regards revenue.

If Mr. Livesey is right, it is not quite the fact that this apparatus of yours is an inheritance from old times, because the Beckton works were erected in 1870, and we understand that they have been equipped with single-lift gasholders and not telescopic ones, which has been very much to the disadvantage of everybody?—I do not think so; Mr. Trewby hat given very good reason for the erection of these gasholders. When ws went to Beckton we were in the middle of a morass, and in a mose exposed situation on the river side.

Do you mean to say that if you went there now you would still put up these single-lift holders?—No, I do not say that; for we have gained knowledge by experience. We have found out that on these marshes we could erect bigger gasholders with safety. We all live and learn—even Mr. Livesey, I suppose, does that.

You find fault with Mr. Haward's tables of the period from 1890 to 1898. I looked over Mr. Haward's evidence only yesterday; and it seemed to me that he explained that your Beckton works were opened in 1870, and, therefore, your large capital expenditure may be taken from 1890 to 1898, when the capital requirements of both your Company and the South Metropolitan were more or less about the same. The year 1898 is the period when you can compare like with like. You complain about Mr. Haward taking the period from 1890 to 1898?—My objection to the period is this: It is a period which embraces exceptionally heavy capital expenditure, and a period when there were reductions in the quantity of gas sold. It was an exceptional period. If you take 1890 to 1898, it is only fair you should take the previous period, which was a very much more favourable one for The Gaslight and Coke Company.

Yes; but I think that in the period from 1882 to 1889 the South Metropolitan Company erected the East Greenwich works?—Yes.

And that accounts for a large portion of the disparity of that period?—Yes; but you must remember that The Gaslight and Coke Company had been called on to erect substitute works, whereas the works put up by the South Metropolitan Company were only additional works. The South Metropolitan Company had to erect premises to meet an extension of business; we had to erect new works to replace old ones—not for new business, but to carry on the work we were doing.

You say your rate of increase is very small; but the Commercial Company told us that their rate of increase is small?—Yes.

Therefore the comparison between them and you would be there. I assert that the Commercial Company show results more advantageous to the consumer than your Company do?—Yes.

Therefore there is no force in the argument on which you relied so much as to the failure of your district to give an increase of business?—Yes; but you must remember that the Commercial Company's district is almost in a ring-fence, and that their increase is in the direction of increased consumption of consumers. They are not like us—they have not had to lay down additional mains to take up the additional work. Their district is already fully supplied with mains.

The Commercial Company did point out that their rate of increase was practically the same as yours?—Yes.

I say, therefore, that the plea of the smaller rate of increase of The Gaslight and Coke Company as compared with the South Metropolitan Company is not such a powerful plea, because, when compared with the Commercial Company, The Gaslight and Coke Company come out unfavourably, though their rate of increase was very much the same as yours?—If you turn to statements put in, you will find the Commercial Company in their rate of increase have been rather better than us.

You will admit that, on the whole, the Commercial Company have been suffering from the same unfavourable circumstances as your Company as regards increase, with the exception of the fact that some of their increase has been due to increase of supply to individual consumers?—Yes.

Subject to like compares with like?—Yes; but you must bear in mind that the business of the Commercial Company is very much circumscribed. The whole of their increasing business can be taken up by their existing plant. They have no necessity for large high-pressure mains or arterial mains.

It seemed to me that you contradicted yourself about your Beckton works. At one time you complained that part of your capital expenditure arose from your Beckton works—you put it down at £700,000—but did you not save a great deal in connection with these works from the easier carriage of coal? Beckton has been an advantage?—Yes; but the advantage we get in working will not reflect on the capital outlay.

You have given us an item of £1,500,000 as the cost of the transfer of the manufacture of gas from London to Beckton?—Yes, that is the figure estimated. I showed a statement as to the writing off of that debt capital at a more rapid rate. The rate at which the capital is being written off has been prescribed for us by the Board of Trade; and therefore it is a matter over which we have no control.

As to the automatic meter supply, the legality of using the 3-light meter has been referred to. Mr. Foulger questions the right of the South Metropolitan Company to distribute meters of that capacity. If it would be such a saving to you to do it, would it not be worth your while to find out whether what is done by the South Metropolitan Company in connection with these meters could not be also done by you?—That would not be very important anyway. The difference is only a difference of 15s. per meter. Mr. Foulger thinks that for a stove to be fixed to a 3-light meter would overtax the meter; but from a pecuniary point of view I do not attach much importance to the matter.

Mr. Trewby said that part of your large capital expenditure, a large amount of which was dormant, was caused by the fact that you had provided for an enormous distribution in foggy weather and unforeseen climatic conditions; and that were it not for that you would be able to supply gas much cheaper. In reply to that, I myself said that the consumer would say that he must stand the diminished pressure for two days in the year in order to get cheaper gas for 363 days. Mr. Trewby

said: "If they would tell us that, it would set us at our ease." Mr. Livesey said it was true his Company were as liable to a great strain as you were; but that his Company reduced the pressure, and that for this reason they were not obliged to have such a large amount of dormant capital?—Yes.

Is it true that if you had not been liable to such pressure you would be able to supply gas much cheaper for, say, 363 days in the year?—The outlay of capital on works to give the high pressure has not been so important as to materially affect the price of gas.

Then you differ from your own officer?—He used the word "cheaper," not "much cheaper." We should be able to supply at the rate of a fraction of a penny cheaper—¼ of a penny cheaper, perhaps.

If it was only such a fraction as that, then Mr. Trewby's point was not a very important one?—No; but it is not only a question of pence, but also of danger. Reduction of pressure, though it is an easy thing to say, is not an easy thing to effect. It is said that we could effect a saving by reducing our pressure; but we have the Underground Railway to consider. Any reduction of pressure might cut them off altogether; so that the question is not merely one of money. We have let out some 200,000 stoves, and once having let out things of that kind, there is an implied bargain that you should keep them fully supplied with gas. If one pinch of cold weather comes and a further supply of gas is called for, and you do not give it, it is a breach of faith.

As to the electric light, you estimated that the amount supplied in your district would equal 3000 million cubic feet of gas?—Yes.

Are you not assuming that the consumers would take gas of the same candle power as the light the Electric Companies supply?—I think they would; but it is only an estimate.

When we hear some people talking of 24-candle power, we do not suppose that they mean a light which would be equal to 24 candles burning together?—No; dealing with shops and private houses high illuminating burners are not used. No doubt if it were not for the electric light, more gas would be consumed than is used at present.

You say that you have provided plant for the supply of a certain quantity of gas, and that now that is rendered nugatory by the electric light; and that, therefore, to a certain extent, the Company's plant has been thrown out of use?—Yes.

Can you explain why, having all this amount of plant which is not in use, you went before Parliament this year for so much capital?—We were only estimating before Parliament on the basis of the 3 per cent. annual increase in our business.

The Chairman: Your answer would be that the capital you require for the purposes of your undertaking is an altogether different and new investment to the capital you have already laid out in gas plant for houses which do not use gas?

Witness: Yes. The £2,500,000 we were asking for in the House of Lords was to enable us to cope with the increase of our business for the present time.

Mr. Steadman: You have very extensive works at Beckton, and very good accommodation for the coal traffic?

Witness: Yes.

And seeing that you stated yourself that it was for only four months in the year there was barge traffic up the canal, does that not put you in a much better position, so far as the unloading of the coals is concerned, than the South Metropolitan Company are in, seeing that they have to use barges all the year round?—Only at certain stations. I gave you the percentages for coal carrying.

Was the object you had in view in proposing your Bill before Parliament to increase your stoking machinery?—Yes; one of them.

You have made most important alterations at Beckton in reference to machinery?—Yes; we are putting it up from time to time.

Have you not introduced appliances which have done away with half the labour of unloading coal?—Yes; we get the unloading done for 1½d. per ton, whereas it used to cost us 4d. That all tended to reduce the price of gas, which reduction had been going on till the change last year.

You told the Committee you had a pension fund for your workmen?—Yes.

You have no profit-sharing?—No; we pay the men their full wages. Ours is a free pension; and we lay down no conditions as to the men belonging to the fund. As to Unions, we take no cognizance of what the men do outside the works. Our system is quite voluntary.

And you find it works well among the men?—Yes; we find it works well, and I think it will have a good effect.

The men do their work well?—Yes. I think every advantage you give to the men somehow or other reflects advantageously on the Company's working.

Mr. Livesey spoke about your Company being dominated by Trade Unions. Is that so?—No; it is an absolute fallacy.

They do not interfere with the output at all?—Not at all. Now and then there is some question put to us by the Gas Workers' Union; but our stereotyped answer is: "If the men want anything let them come to us. We do not recognize outside people." If we find any attempt to interfere with our business on the part of one of our men, we give him the sack at once; but we do not object to the men joining Unions. We leave it optional with them.

Mr. Lough: You have put in a further table to-day?

Witness: Yes; and in it there is a comparison between 1892 and 1898. I selected 1892 because that was the first year of my management. I was directly challenged upon my management by Mr. Livesey; and I was obliged to justify what I had done during my tenure of office.

If you had taken 1891, would not the result have been quite different?—I have not worked it out.

Was not the amount for residuals less by 1s. 10d. in 1891?—Yes.

If you had taken that year, the figures in the result would have been different to those you have shown?—I showed that between 1892 and 1898 there was a reduction in residuals of 1·25d. In the case of the South Metropolitan——

Let me stop you there. You have shown a reduction of 1·25d. What would it have been if you had taken in the year 1891?—1s. 7·10d.

That is very different, and less favourable to you?—As compared with the South Metropolitan Company, yes; but as compared with the Commercial Company, no.

The year you have taken shows an improvement?—No; a slight reduction.

But if you had taken the previous year, you would have shown a reduction more to your disadvantage. Therefore it was a selected figure?—It was not a selected figure, with all deference to you.

How do you compare 10,600,000 units of electricity with 1,064,000,000 cubic feet of gas?—That is the generally accepted way of comparing the two.

What is your cost price on the north side?—2s. 10·22d. We make more cheaply at Nine Elms—viz., at 2s. 4·45d.—than at any place save Beckton. But with the charge in respect of capital added to the Beckton cost, the manufacture there is rather dearer. When I gave the figures this morning as to Beckton, I did not know that I excluded the capital charge. The cost of making gas is cheaper at Beckton than at Nine Elms; but including the charge on capital it is dearer.

All things taken into account, you make gas cheaper at Nine Elms than at Beckton?—I do not know that I can go so far as that. A large amount of the capital expended at Beckton is capital expended in anticipation of future extension. Take the pier, for instance.

Further examined by Mr. Lough: Of the gas made at Nine Elms, about 900 million cubic feet per annum were used on the south, and about 1000 millions on the north; so that the greater portion of the make at these works was consumed in the north. Nine Elms was very conveniently situated on the river. The works were only technically on the south—merely the bed of the river separating them from the north—so that really they were very advantageously situated for supplying the north. The cost of making gas there, including capital, was lower than at any other works. The South Metropolitan Company could not make gas more cheaply than the Gaslight Company at the Nine Elms works. He did not think that, if the South Metropolitan Company took over the district and managed it as well as they could, it would lead to any raising of price above what they were charging elsewhere in the south. Pressed as to whether it did not pay sometimes for the owner of a business to take smaller profits in order to work up trade, witness agreed, but said that in the case of the Gaslight Company he could not get away from the fact that Parliament had put on them the obligation to sell their capital by auction, which carried with it the obligation to give to the buyer of the stock the dividend to which he was entitled. He did not see why they should give up dividend in order to lower the price.

Mr. Lough: Have you not to face keen competition with the electric light?

Witness: Yes.

Do you not think it would help you to face it, to sell your gas at 6d. per 1000 cubic feet less?—No; not 1s. less. You may reduce the price of gas by 1s. 6d. per 1000 cubic feet, and I do not suppose you would get any appreciable number of electric lighting consumers back again.

Do you not think if you reduced the price of gas by 1s. 6d. you might increase your business?—Certainly.

Have you not told the Committee that the chief reason for the bad position of the Company is that your business is not increasing as much as you would like?—Yes.

Would not a reduction of price be one way of making it increase?—Yes; but no small reduction brings about any large extension of business. That is our experience for the last twenty or thirty years. Some of the Company's gas is used for power purposes, and electricity is competing with us there. If we reduced the price of gas, and the reduction were material, it would help us to compete with electricity used for this purpose. A reduction of 4d. means about £320,000; and the total dividend of the Company amounts to about £1,000,000. In the last seven years the Company have paid every fraction they could as dividend.

May we trace it to you—this policy of paying the last penny of dividend?—The policy and the dividend are settled by the Court of Directors. All this was very fully explained by Colonel Makins.

During the last six years, did the South Metropolitan and Commercial keep a little in hand and pay their full statutory dividends?—Yes.

And yet they sold their gas at less than you?—Yes. I knew last year that the present Committee were to be appointed. The price of gas was raised by the Gaslight Company in 1898.

Will there be any reduction this year?—I cannot say. The capital of the Company is, roughly, 83 per cent. share and 16 per cent. debenture.

If you had got the 2½ millions of capital at 3 per cent. under your Bill of this year, it would have been a great advantage to your ordinary shareholders?—Yes.

Any profit above 3 per cent. realized on that capital would have gone to the ordinary shareholders?—And consumers—five-sixths to the consumers and one-sixth to the shareholders.

It would have greatly improved the position of the ordinary shareholder?—Not greatly—it cannot be greatly. We can raise our ordinary share capital to pay 4¼ per cent.; and the only saving would be 1¼ per cent. on £2,500,000, spread over a capital of £28,000,000—a very small thing.

It would have been a very material saving?—I cannot say yes to that, because in view of these figures the saving must have been very small.

Whatever it would have been, it would have gone to the benefit of the ordinary shareholder?—No; it would have gone in reduction of the price of gas, and thereby the shareholders would have got their proportion.

You say the Committee have scarcely had any definite charge made against your Company until Mr. Livesey came into the box?—Yes.

Does it not seem to you that the evidence given by the London County Council forms a series of grave charges?—No; I will tell you why. There was nothing specific. When you bring a charge against a man, I believe you must substantiate your charge by reference to some specific misdoing; and nothing of that kind was preferred by Mr. Haward.

First take Mr. Hunt. Does he not say the price you charge is unnecessarily high?—He says so; but he produces no evidence in support of that statement.

It is 10d. per 1000 cubic feet more than the community on the south of the river pay?—Yes.

And each penny represents a charge of £80,000 a year?—About £80,000.

And the whole 10d. means an extra burden of £800,000 a year on the people who live in your district?—Yes.

Do you not think that a serious thing?—Yes; but it is not a charge—it is simply a statement of fact. There is no specific charge that our doing so, or the cause of our doing so, is brought about by any mismanagement or wrongdoing by our Company. I agree that the sole

effort of Parliament in regard to gas, and the sole inducement to give monopolies to companies is to get the price reduced to the consumers. The fact that we charge 10d. more than the other Companies would be a grave charge if it could be shown that it was due to mismanagement.

Did not Mr. Hunt also say you had spent £1,567,000 of capital more than was necessary?—Yes; a most unblushing statement. He made the charge, but did not support it by a word of evidence—not a scrap.

Did not Mr. Haward make a series of grave charges against you of the same character?—Will you give me one of them?

The one I have mentioned—the 10d.?—It is simply a statement of fact.

You admit that your accounts contain £1,500,000 of capital for works that are entirely disused?—No; and there is no evidence before the Committee to that effect. I think I have given the figure in evidence as £375,000. I have given you £1,500,000 as the cost of transferring the manufacture to Beckton; but out of that sum there is only a very small proportion which represents the value of works dismantled. The other is represented by the cost of mains leading to Beckton, the substitution and transference of manufacture from Bromley to Beckton, the erection of products works, the railway and the roads, and things of that kind. The only item of unliquidated capital is £375,000, which is the book value of the disused works. The £1,500,000 represents the capital which the other Companies have not had to expend on similar works; but to say that all this expenditure is not productive would be to mis-state the case.

Well, it is not productive in reducing the price?—No.

As to automatic meters, what are you charging per 1000 cubic feet south of the Thames?—3s. 4d.

How much are the South Metropolitan charging?—I have forgotten.

They are charging 3s.?—I did not know that.

Are you not bound by Act of Parliament to charge the same price on the south as they charge?—For gas, yes.

Do you charge these working people who use the penny-in-the-slot meters the same price on the south as the South Metropolitan?—Precisely.

You cannot answer that without knowing what the South Metropolitan charge?—The charge we make the penny-in-the-slot customers is an inclusive charge. There is no obligation on this or any other company to make a definite charge for the use of meters, stoves, or gas-fittings. It is a matter of bargain between the Company and the consumers. The Gaslight Company charge 5d. per 1000 cubic feet to automatic-meter consumers more than the South Metropolitan Company; but the charge for gas is 2s. 2d.—the balance being for the hire of the fittings.

You agree that for meters and other fittings, for which the South Metropolitan charge 9d., you are charging 1s. 2d.?—Yes. When we raised the price of gas 2d. to ordinary consumers, we reduced the quantity of gas given for a penny by automatic meters from 25 to 22 cubic feet.

You gave considerable evidence in support of the difference of charge between yourself and the South Metropolitan?—Yes.

Are there no points in which you are more favourably situated than the South Metropolitan?—Will you put one to me; then I may be able to answer your question.

No; you know the case better than I do. What you have done to the Committee is this: You have said you are so many pence over the South Metropolitan; and then you have taken the disadvantages you labour under. Now, I put it to you, are there no advantages you have over that Company?—I do not know of one.

I do not think you have treated the Committee quite fairly in that. You pointed out each of the charges which are higher, or the difficulties you are in; but you have spoken of no advantages?—No.

You do not think there are any?—No. My endeavour has been to act perfectly fair with the Committee throughout.

Yes; but one may forget points in one's own favour sometimes.

Further cross-examined: He did not think it a material fact that his Company's business was so much larger.

Mr. Lough: Do you claim that you sold your coke better than the South Metropolitan?

Witness: No.

You have no advantage over them?—No. In fact, my evidence is just the contrary—that we do labour at Beckton under certain disadvantages that the South Metropolitan have not.

In the shipment of coke you have a great advantage?—Yes; but I explained that with the coke sold for export or to the cement makers we are obliged to accept a very much lower price than we should if the coke were sold in London.

In the same way with sulphate of ammonia, did you not claim that you did better than the South Metropolitan?—Well, we do do better there; I do not know why.

You do not think any of your advantages counterbalance any of the disadvantages?—Unfortunately, they do not.

In answer to further questions, witness agreed that charges had been made as to the purchase of coal and sale of coke that the Company were very absolute, and that they refused very good offers because they wanted to get better.

Mr. Lough: The charge we have heard is that this policy you have adopted has not answered, and that you have lost more than you have gained by it?

Witness: I have followed the evidence very closely, but have not seen a tittle of proof of this.

But you do make this contract?—Yes; there is a clause in the contract to that effect—an ordinary clause, which business people put in contracts every day in the week.

It is aimed at your rivals?—It is aimed at nobody at all.

You think there has been no disadvantage to you accruing from the policy you have pursued?—No. Like all other tradesmen, we have to consult the wishes and desires of our customers, as well as everybody else.

In any fresh arrangement made with the Company, Mr. Livesey says it would be fair to alter the standard price—do you agree with him? Would that be fair?—Yes; Parliament, when a new arrangement is made, can do what it likes. We must not demur.

You would not object to Parliament altering the standard price to, say, 3s. 3d., in return for their sanctioning a new application for capital?—No; so long as the new standard price was applied to the new capital only. It should not be applied to the existing capital. You can do what you like with regard to new capital.

Would not the existing shareholders benefit by your getting new capital?—If we had obtained our Bill on the terms we submitted to Parliament, the shareholders would be benefited to the extent of 8d. per cent. Instead of receiving £4 18s. 0s. per cent., they would have had £4 18s. 8d.

Then you admit that if Parliament grants you power to raise new capital, it will benefit your shareholders?—Yes.

And in return for that, would it not be fair to ask the Company to submit to a reduction in the standard price?—If you can tell me what reduction in the price would be equivalent to 8d. per cent., I think I might say yes.

At any rate, to whatever extent the shareholders would be benefited, you think the standard price should be reduced?—Yes; I think so, speaking entirely in my private capacity, and not as an officer of the Company.

Did you know that Parliament reduced the standard price 6d. in the case of the Lea Bridge Company?—Yes; but the circumstances in that instance were different. For years they had not been declaring the full dividends to which they were entitled, and had not charged their maximum price, which was very high. The people knew that they would not get their full dividend. I cannot say that in that case Parliament did not act fairly in reducing the standard price. It was justified in doing what it did. My evidence on these matters, it must be understood, is of an unofficial character.

Your standard price is higher than that of the South Metropolitan Company?—Yes; but the same as that of the Commercial Company.

You have been charging less than the standard price?—Yes. But we have been paying our full dividends; and that is the difference between ourselves and the Lea Bridge Company.

You have been dividing dividend without putting anything by to the reserve fund?—Yes.

Are you paying 1 per cent. less dividend than the South Metropolitan Company?—Yes.

And charging 10d. per 1000 cubic feet more?—Yes.

Does that charge not seem out of proportion to the advance in dividend?—Parliament settled all that for us in 1876.

Do not you think the circumstances have entirely altered as to the standard price since 1876?—Witness replied that the initial cost of making gas had gone down, hence the lower price. His Company were charging a higher price than any town in England but Preston. They were charging 6d. more than they charged ten years ago. He could not, however, say that "their price was going up, while that of the South Metropolitan Company was going down." It was only last year that the South Metropolitan went down 1d. and the Gaslight Company went up 2d.—it was only last year that the difference in the normal condition of things occurred. In twenty years they had reduced their price 7d., and the South Metropolitan had reduced theirs 1s. 3d.; but it was not fair to compare these figures. Between 1876 and 1897, the Gaslight Company had come down in price almost penny for penny with the South Metropolitan Company.

The price charged by the South Metropolitan is lower than it ever was?—Yes.

And yours is 6d. higher than it was ten years ago?—Yes.

Then how can you say you have gone up and down with the other Companies?—You will find the figures in the tables I have submitted.

Is there any prospect——?—I never prophecy.

As to your reserve fund. Do you think you will in future charge a less price, or reduce your dividend and make up your reserve fund?—As I say, I will not prophecy.

You say you give gas of a higher illuminating power than some of the outlying districts?—Yes.

But according to the returns, some of these supply gas of the same illuminating power as you? I have the figures in your own book?—Yes; but the figures are subject to the explanation that great difference exists in the mode of testing.

That must be taken as altering the figures in your book?—Yes; to some extent.

Would you think any of Mr. Livesey's suggested remedies fair?—I should say they were most outrageous, and most dishonest.

He said it would be better for you willingly to concede something in the way of dividend, in order to improve your position and benefit the position of your Company. Would you agree with that?—No; he has said himself that any interference with the standard rate of dividend would be an injustice. I see no difference in seizing a man's goods and putting them to your own use temporarily, and in putting your hand into his pocket and easing him of his money permanently. The difference between a temporary and a permanent breach of faith is not worth considering. The Gaslight Company are not obliged to carry anything to reserve, though it was true we got reserves from the Companies we amalgamated with.

Do you believe in the policy of paying away this reserve?—I think it was most judicious. If we had not adopted this policy, we should have had to raise the price of gas, which would have been a most objectionable thing.

Do you think that in any well-managed business a person would not use some of his profits to build up a reserve to keep for a rainy day?—You cannot compare a company in difficulties as to how their capital shall be raised with a private person who can do exactly what he likes.

Mr. Lough asked what would happen now that the Company had been unsuccessful in getting their Bill through the House of Lords.

Witness was understood to reply that the public would have to pay the Company the full price for making the gas, *plus* interest on capital.

Asked whether this would not affect the position of the Company, witness replied that it would not affect them altogether, because, after all, the main consideration was the power of charge.

Mr. Lough: And you charge up to the extent of your powers. Taking the whole case, and looking at it as broadly as possible, suppose Parliament does not interfere, do you see any prospect of reducing the price of gas?

Witness: If you will give me a good return, I will reduce the price of gas. The whole thing is in a nutshell. If you will kill off a large

proportion of the people by a cold, frosty winter, you will get a large reduction in the price of gas.

The CHAIRMAN: You charge in the north 3s., and in the south 2s. 2d.; and you say the average price, including north and south, is 2s. 10d.?

Witness: Yes; and a fraction.

The question I want to ask you is, Why is it you calculate your dividend upon your 3s., rather than upon the 2s. 10d. and a fraction?—It is stipulated in the Scheme of Amalgamation with the other London Companies that the dividend should be calculated on the highest charge. It is not parliamentary; but I say by the Scheme of Amalgamation it has the force of a parliamentary arrangement.

The CHAIRMAN thanked the witness for the patience he had exhibited during his long examination and cross-examination; and announced that it was not proposed to take any further evidence, and that any ensuing meetings of the Committee would be of a private character.

HOUSE OF COMMONS COMMITTEE.

Tuesday, July 4.

(*Before Sir* W. HOULDSWORTH, *Bart., Chairman, Mr.* D. A. THOMAS, *Mr.* LUCAS SHADWELL, *and Mr.* WENTWORTH BEAUMONT.)

LEA BRIDGE DISTRICT GAS BILL.

This Bill, which has already been passed by a Committee of the House of Lords (see "JOURNAL" for March 28 last, p. 798), came before the above-named Select Committee of the House of Commons to-day. The four principal objects of the Bill are to enable the Lea Bridge District Gas Company to consolidate and convert their present capital, to raise additional capital, to use certain land already in possession of the Company for the purpose of new works for the manufacture and storage of gas, and to acquire additional lands by agreement.

Mr. LITTLER, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., and Mr. A. V. FRERE appeared for the Company. Against the Bill, Mr. PEMBROKE STEPHENS, Q.C., and Mr. HUTCHINSON represented the Leyton Urban District Council; and Mr. PEMBROKE STEPHENS, Q.C., and Mr. COURTHOPE MUNROE, the Walthamstow Urban District Council.

In opening the case for the promoters, Mr. Baggallay recited the history of the Company as laid before the Committee of the House of Lords by Mr. Littler. In enumerating the advantages which the consumers would obtain under the Bill, Counsel pointed out that the Committee of the other House, of which Lord Camperdown was Chairman, had, in passing the Bill, reduced the standard price for gas from 5s. to 4s. 6d. The Company, of course, resisted the reduction to the uttermost; but as it was put upon them, he supposed they would have to submit. It was, however, an absolutely novel proceeding; for never before since the introduction of the sliding-scale system, with its initial price and initial dividend, had the initial price, once having been fixed, been altered by Parliament. There was very good reason why this had never been done. The initial price and the initial dividend were fixed having regard to the circumstances of the time, so as to bring about a fair division of business between the two partners—namely, the consumers on the one hand and the shareholders on the other. This matter was fully threshed out in 1875 and 1876 before a Select Committee, of whom also Lord Camperdown was Chairman, with the result that in the case of the three great Metropolitan Companies the initial price and the standard dividend were fixed. In 1876, Lord Camperdown was dissatisfied with the arrangement that was come to, and in the House of Lords tried to get a clause embodying his own views put into certain Bills. It was pointed out by Lord Cairns, Lord Carlingford, and Lord Salisbury, and also by the Board of Trade (in a report made by the present Lord Farrer) that to provide for any alteration of the circumstances consequent upon the fixing of the standard price and standard dividend would be very unfair, for the reason that a bargain was settled by Parliament under which shareholders gave up their claim to back-dividends under the General Act. Further, by accepting the auction clauses, they were prevented from allotting new capital among themselves, and were bringing in premiums in reduction of the dividend-bearing capital. They were also giving up their guarantee of 10 per cent. dividends under the General Act. In consideration of the advantages which the consumers were thus getting, the House of Lords rejected Lord Camperdown's motion. Mr. Bright, when President of the Board of Trade, had stated that a bargain once made, and upon which investors had subscribed their money, was not one which should be altered. That was the case here. Upon every penny of the capital issued since 1878—namely, £21,000 odd—a premium had been paid on the faith of the initial price and the initial dividend fixed by Parliament in that year. What had been done in altering the standard price, altered the conditions on which people had subscribed their money. He would not ask a Committee of one House—though Committees had done it before now—to over-ride the decision of the other House; but it was an exceedingly important matter. It had struck a blow at all parliamentary good faith, and the bargain on which capital had been obtained. The reduction of the initial price by 6d. per 1000 cubic feet was equivalent to taking off 1½ per cent. of the divisible dividend-declaring power of the Company; reducing the margin within which the Company could work in the event of difficulties arising from a coal strike or other contingencies. The alteration was one which was to the advantage of the consumer without any corresponding advantage to the shareholder, but, on the contrary, a distinct disadvantage. Lord Camperdown had thought the opportunity a favourable one for making this change, because the Company had not distributed to their shareholders the full amount to which they were entitled, having regard to the fact that they were charging only 3s. 10d. In fact, it was because they had done a good thing for the consumers and charged them 10d. less than might have been charged considering the dividend paid, that the Company were now mulcted of a portion of their margin.

Mr. Pembroke Stephens inquired whether Mr. Baggallay was asking the Committee to put back the standard price to 5s.

Mr. Baggallay declined to answer the question at that moment, but instanced the case of the Basingstoke Gas Company some years ago, where, one Committee having altered the capital fixed in the Bill, a Committee of the House of Lords, presided over by Lord Jersey, on the representations of Mr. Littler and himself, restored the capital to its original amount; and the Bill was passed in the form in which it was first proposed. While feeling a difficulty in asking the Committee to say Lord Camperdown was wrong, he put before them what he thought were the merits of the case; and he would consider whether it might not be a proper thing to ask for the restoration of the standard price to 5s.

The Chairman: You cannot argue it both ways. You were first arguing that it was a concession to the consumer. If we restore the 5s., the advantage to the consumer goes.

Mr. Baggally replied that that was one advantage the consumers had; and they were not entitled to it. They had enough without it. Dealing then with the petitions of the two Local Authorities asking for the rejection of the Bill or the insertion of purchase clauses, Counsel said there was no case of a gas undertaking being transferred to a local authority on that local authority's petition. The proper procedure was by Bill promoted by the local authority with the permission of the ratepayers. It would be a very hard thing—unless for some very good cause—to put in a purchase clause or a clause providing against enhancement of value in the event of purchase, in the case of a statutory company. Its practical effect would be to keep companies away from Parliament for as long as possible.

The first witness called in support of the Bill was Mr. H. E. Jones, who said the Lea Bridge Company had works now in progress, and for which contracts had been entered into, which would exhaust the whole of their unexpended capital. He handed in a table to show that these works would be absolutely required this year. The Company had, in fact, come to the end of their resources, both as regards capital and land. There had been extraordinary development of late years, owing to the facilities afforded by the Great Eastern Railway, which had attracted a large working-class population to the district. The sale of gas had increased from 72,360,000 cubic feet in 1894 to 114,103,000 cubic feet in 1898; while the percentage of increase for the last three years had been 13¾. He considered the Company should be put in a position to deal with the demand for coin-freed meters. This would involve the expenditure of a large extra amount of capital, because the Company would have to supply the fittings free.

The Chairman inquired whether he might take it that it was not contended that no extension of the works and capital was required.

Mr. Hutchinson asked the Committee to reject the whole Bill.

Witness (continuing) said the normal expenditure of capital by the Company had hitherto been £900 per million cubic feet of gas sold. In future, he thought £600 or less would be required; and, in addition, another £400 for the coin-freed meter system. He did not, however, pretend to say that the whole of the increased sale would come from this source; and therefore it would be better to take it as an average of £200 upon the whole supply—making £800 per million cubic feet. To the best of his knowledge, it was absolutely unprecedented to insert a purchase clause in a statutory company's Bill. The action of Parliament in putting a clause on non-statutory companies, when coming for incorporation—enabling the local authority to purchase the undertaking at its original value—was exercising a deterrent effect upon some clients of his; and a number of small non-statutory companies were keeping away from Parliament because they did not want to be compulsorily deprived of their business. Some non-statutory companies were very profitable; dividing from 10 to 15 per cent., and making what kind of gas they liked. They also enjoyed many other liberties rather against the public interest. It was therefore unfortunate that they had been scared away from Parliament. Though if they objected to the clauses these small non-statutory companies need not proceed, yet the Bill would be a serious expense to them. They would find that they had thrown £600 or £700 away, and obtained nothing for it. The total present capital of the Company was £128,191; and the additional capital now asked for was £187,500—making £315,691 in all. The whole of the additional capital would be exhausted in less than twelve years. He considered that with the improved burners it was unnecessary—and, indeed, in great part wasteful—to insist on high illuminating power; so much of the gas being used for heating and cooking purposes. He did not know of any company so small as this where the testing-station was away from the works. The method of testing adopted in the case of the Metropolitan Companies was far too cumbrous and expensive to saddle a small undertaking with. If the illuminating power were left at 14 or 15 candles, the Company would very nearly be able to do without water gas; but the chief use of water gas, of which the Company were using about 30 per cent., was, of course, for enriching purposes. The present method of manufacturing water gas rendered it less dangerous than formerly, for it had now a very pungent odour. Although he knew nothing of his own knowledge about the complaints, he would point out that, whereas the normal average increase of consumption in all companies like the Lea Bridge was only about 5 per cent., for the last two or three years this Company's increase had been something like 13½ per cent. With such an abnormal increase, the Company would be everlastingly pulling up their pipes and enlarging their mains; and this would naturally cause interruption and inconvenience in the supply.

Mr. Richard Sandell, Secretary of the Company since 1882, repeated his evidence in favour of the Bill. He thought outside the Metropolis 15 candles was the usual standard. Of the gas companies in England and Wales, 90 per cent. were supplying gas of 15-candle power and under. He had lived in the district for 14 years, and had never had to complain of the gas being of a low illuminating power. According to the reports of the petitioners' own gas examiners the illuminating power had only been below the statutory standard on four occasions; while the deficiency in pressure had been very trifling, even though the tests were taken outside the works. As to the complaints about the street lighting, he contended that burners of only 4 cubic feet per hour capacity were too small for 14 or 15 candle gas, and that the distance between the lamps (from 70 to 98 yards) was too great. In his view, the lamps should not be more than from 40 to 50 yards apart. In January, 1893, the Company were fined £10 for the gas being below the standard illuminating power; but the Magistrates at the time expressed a doubt as to whether the test had been taken in a way to be depended upon. As to the provision of a testing-station away from the works, he thought

it totally unnecessary, as the extreme corner of the district was only about 3½ miles from the works.

In cross-examination, witness contended if they went back to the history of any gas company charging a cheaper price than the Lea Bridge Company, it would be found that when their operations were on as small a scale their price was as high as that of the Lea Bridge Company to-day. The policy of the Company had been almost to invite complaints; but these complaints did not necessarily infer dissatisfaction. It merely meant that customers pointed out something the matter with a local supply. He admitted that the West Kent were a smaller Company than the Lea Bridge Company, although their working cost per 1000 cubic feet sold came out, according to "Field's Analysis," at 17·78d., as against the 21·68d. of the Lea Bridge Company. The Company would certainly not accept any purchase clause.

In re-examination, witness said that, as far as he knew, the Company had never been approached on the question of purchase, and had heard nothing of it until it was started as a bogey before the Lords' Committee. The Company had requested the Local Authorities to place lamps at distances of not more than 50 yards, and had said they would not undertake to lay new mains if this were not done; but the Authorities had had their own way on some few occasions. The Company had also complained of the testings of the Gas Examiner of the Walthamstow Council. They asked that an independent and impartial person might be appointed to make check tests, and offered to bear the expense of any arrangement that might be arrived at. The Council had ignored this request.

Wednesday, July 5.

Mr. F. W. Cross, Engineer and Manager of the Company, gave evidence as to the growth of the business since 1894, and the need of further capital expenditure.

The Chairman, on behalf of the Committee, put it to Counsel for the Walthamstow Urban District Council whether he contended against the necessity for very considerable extensions in capital and works.

Mr. Hutchinson, in reply, said he was going to contend that the Committee should not give the Company additional capital powers. For the purposes of immediate consumption, and a reasonable period, the Company did not need any further capital powers to deal with their supply; and the district would not suffer by the rejection of the Bill.

Examination continued: The district would undoubtedly suffer by the rejection of the Bill. The works on the present site were crowded to their utmost capacity; and extensions there could not be carried out with utility. If the demand continued to increase at its present rate, it would be impossible to provide the required output of gas. Nothing tended more to increase the cost of manufacture than a cramped site with irregular machinery and buildings; and every economy in management was an advantage to the consumer. The area of the Company's site, including the new land, was 8½ acres; and the portion available for manufacturing purposes would be covered in five years. The Company would be obliged to come to Parliament for further powers in ten years' time. Since 1894, the make of gas had increased by 42 per cent., while the sale had increased by 45 per cent.; the difference of 3 per cent. being due to economy in management. The maximum daily sale in 1895 was 448,100 cubic feet, while in 1898 it was 652,000 cubic feet; being an increase of 50 per cent. in the three years. On the new land works could be carried out which would enable 4 million cubic feet per day to be manufactured; bringing the annual make up to 750 million cubic feet. The annual make would reach 400 millions at the close of ten years, and 750 millions at the close of fifteen years. At present, the retorts were equal only to a maximum make of 580,000 cubic feet; the actual working capacity being 490,000 to 500,000 cubic feet. The storage capacity was about 50 per cent. of the maximum day's output. Plans were now in preparation for a new retort-house capable of producing 840,000 cubic feet per day; while a gasholder having a capacity of 640,000 cubic feet was being erected. With this holder, combined with the water-gas apparatus, the capacity would be sufficient for the next four years. If the Company did not get the works proposed, by the end of the winter of 1900 the district would stand in jeopardy of being in darkness. Considerable lengths of totally unremunerative mains had been laid for the benefit of Local Authorities; many of the streets making no demand on the mains beyond the public lamps. The exceptional increase in the Company's business during the last three years would render futile all comparisons with other companies. Increased charges in the cost of manufacture and in wear and tear had resulted from the want of apparatus. In the capital asked for, the Company had not calculated on slot meters for the next ten years. Under ordinary circumstances, they would spend the £187,000 in ten years. When they started the automatic meter system, they would expend £400 for every million cubic feet of gas sold; and the capital would be exhausted in less than ten years. Practically the whole of Walthamstow was in the Company's district, but only a very small part of Leyton, with a much lower population per acre—namely, 12. The portion of Leyton in the district of the West Ham Company, however, had a population averaging 50 per acre. Judging by the experience of Hastings and Croydon, there was nothing abnormal in the number of the Company's complaints. Witness handed in a table to show that the Company had always exceeded their statutory obligations as to pressure; but he said they were quite willing to accept 10-10ths instead of 8-10ths. Dealing with the complaints, witness said consumers were very loth to admit that the fault was in their fittings; and he exhibited specimens of bent pipes to the Committee as samples of the difficulties the Company had to deal with. Independently of stoppages from naphthalene, the complaints had arisen almost invariably from defective fittings. As a result of 164 tests in December and January last, the Company's officials obtained as their lowest reading 14·58 candles; while in the same time the lowest reading of the Gas Examiner was 14·7. There were in the Gas Examiner's report two instances of where the gas was below 14 candles. The latter occurred on May 12, and lasted for about 1½ hours. It was due to some weathered coal happening to get into the retorts. The Examiner had always certified that the standard of purity fixed by the Gas-Works Clauses Act, 1871, had been complied with. He was sure that the powers asked for in the Act would enable the Company to reduce the price below 3s. 10d.

In cross-examination by Mr. Hutchinson, witness admitted he had stated in the other House that he could see no objection to using 50 per cent. of water gas, as was done in Tottenham. Witness agreed, as a matter of arithmetic, that taking his full retort capacity at 580,000 cubic feet, and adding 290,000 cubic feet, of the total water gas capacity of 350,000 cubic feet, his works were at the present time equal to a supply of 870,000 cubic feet per day. He calculated that the Company would be sending out 870,000 cubic feet in the winter of 1900, taking the maximum daily output as a basis. The £25,000 of capital expended since the Bill was in the other House had only brought the Company up to date so far as the purposes of the moment were concerned. He admitted that only two of the 270 artisan consumers were at present furnished with prepayment meters. The District Councils were asking the Company to fix these meters, and at the same time preventing them getting the money to do it.

In cross-examination by Mr. Pembroke Stephens, witness said that for the flat-flame burners used by the working classes 14-candle power gas was better than a higher standard. He admitted that the Company only supplied gas to about one-eighth of the houses in their district.

By the Chairman: The works in 1895 were a little run down, owing to the long illness of the previous Manager. It was, however, in that year that the abnormal development began, and the difficulties commenced—the works not being in a position to cope with the demand.

Mr. Joseph Cash said he considered the powers sought in the Bill were necessary to enable the Company to fulfil their statutory obligations. On an estimated annual increase of 12 per cent., and an expenditure of £800 per million, the capital outlay sought in the Bill would be overspent in ten years. The reason of there being so small a number of consumers compared with the number of houses, was that the houses were of a comparatively small character, and the tenants had difficulty in getting the landlords to put in fittings. Apart from slot meters, the sale was a fair average for a district which had no large manufacturers or railway establishments, and was purely residential. He thought it would be rather to the advantage of the Gas Company to push their sale by supplying the fittings themselves, instead of leaving it to the landlords. This would, however, involve a very considerable expenditure. The cost of the slot fittings averaged about £6 7s. He had found that the use of gas-cooking stoves was extending amazingly. He estimated that the capital outlay per million cubic feet of gas sold by the automatic meters in the Lea Bridge Company's district would be £420. In the estimates, it had been assumed that the whole of the increase would not be entirely due to the introduction of the prepayment system; and therefore the capital outlay over the whole for the next ten years had been put at £200 per million. He was not an advocate of high-power gas, and would have preferred to see the 14 candles left in the Bill as being better for the Company and the consumers. In his opinion, the standard quality which could be produced from the coal that was cheapest and most available in the district should be the standard quality of the gas supplied. Otherwise, all the increase was obtained at an extraordinary cost by the addition of some hydrocarbon or coal of an expensive character, such as cannel. He thought the Lea Bridge Company had behaved rather too well to the consumers in the reductions made, and considered the Company were to a great extent martyrs in having had their standard price reduced by Lord Camperdown's Committee. He handed in a table to show that the Lea Bridge Company had a much smaller consumption per mile of main compared with companies in neighbouring districts, and that the cost of gas into the holders was only ½d. per 1000 cubic feet more than in the case of Tottenham and West Ham—respectively 4½ and 9 times the size.

Cross-examined by Mr. Hutchinson, witness said he thought the standard of purity under which the Company were working was quite good enough for a Metropolitan district. The present test would not show bisulphide of carbon in the gas. In the case of the West Ham Company, the test imposed was practically the Gas Referees' test.

In cross-examination by Mr. Courthope Munroe, witness said the West Ham Company were able to work cheaper than the Lea Bridge Company from three special circumstances: Firstly, the difference in the mileage of mains; secondly, the cramped position of the Lea Bridge works; and, thirdly, that the West Ham Company had practically starved their works. He pointed out, however, that the West Ham Company were charging 4s. 6d., as against 3s. 10d.

In re-examination by Mr. Baggallay, witness said that in small companies all the standing charges were exaggerated. The whole area of the Company was in a state of transition from a rural district into a town district, which necessarily revolutionized the way in which the Company had to carry on their business.

This concluded the evidence for the promoters.

Thursday, July 6.

Evidence was to-day called in support of the petition of the Walthamstow Urban District Council.

Mr. Frank Hanson, foreman to Messrs. Phelps, printers, of Walthamstow, said that his experience of the use of the Company's gas by his firm extended over seventeen years. At times the gas had been very bad; while on other occasions it was all that could be desired. So uncertain was it that Messrs. Phelps were obliged to have oil-lamps placed permanently in their rooms, in order to supplement the gas light when necessary. His firm had made frequent complaints to the Company about the quality of the gas, and also as to insufficient pressure.

Witness was cross-examined to show that the cause of complaint would be removed, as both the pressure and the illuminating power were increased by the present Bill. He admitted that since his evidence in the last House the Company had refitted burners on the premises, and that the light had been better.

Mr. Thomas Frix, a member of the District Council of Walthamstow, gave corroborative evidence. He said he had four places of business and a residence in Walthamstow. At times the light had been so bad that, with two burners in a 16 feet square room, he was unable to see to read. The pressure was not sufficient to fill the mantles, which did not become incandescent. The Council had also received many complaints both as to public and private lighting.

Mr. Charles James, Chairman last year of the Walthamstow Urban District Council, and formerly a member of the School Board, also gave evidence as to the bad character of the gas. He said the light was a miserable blue light. When he went into the neighbouring districts

supplied by other companies, he found quite a different light, such as they would desire to have in Walthamstow. He was prepared to pledge both Authorities in the House of Lords that they would come next year with a joint Bill to purchase the undertaking of the Company. Since then specific resolutions in this sense had been passed by the Councils, asking the rejection of the Bill or the insertion of purchase clauses.

In cross-examination, witness said he desired the Bill to be thrown out. He was aware that the Company were nearly at the end of their capital, and that the new population were applying to them to have gas laid on. He said he would prefer to risk that the demands of the consumers should not be adequately met pending the Local Authorities getting their Bill, than that the Company should have this Bill. In promoting their Electric Lighting Provisional Orders, the Local Authorities, he admitted, probably considered that they would be able to acquire the gas undertaking cheaper than they otherwise would be able to do. The land for the electric light installation had been purchased, and the works were in course of construction; but the light was not yet being supplied.

In re-examination by Mr. Courthope Munroe, witness said the two Local Authorities were prepared to pledge themselves to promote a Bill for purchase next year; while he was advised that the electrical works would not be ready for use for two years.

Mr. Charles J. Geury, the present Chairman of the Council, said it was the desire of the Council to take over the undertaking. If the shareholders got the fair value, *plus* 10 per cent. for compulsory purchase, they would not have much to complain of.

Mr. Ernest J. Gowen, Clerk to the Council, produced correspondence with the Company relative to the alleged bad quality of the gas from the year 1878. He detailed the circumstances under which, as a result of a dispute as to price, the Council used oil instead of gas for the purposes of street lighting for about two months. During the last three or four years, the Council had made no complaints to the Company as to the gas, because they found their representations were unheeded.

A number of other witnesses were also called from Walthamstow and Leyton, to show that the complaints as to the poor quality of the gas supplied were general all over the Company's area of supply.

Friday, July 7.

Mr. Cross was to-day recalled to give rebutting evidence as to the complaints. He explained how they arose, and what was done by the Company to remedy them. Dealing with the specific instances which had been submitted to the Committee, he said that since these complaints had been attended to by the Company, no fresh ones had been made; while one complainant had opened additional shops and taken more gas.

In reply to the Chairman, witness said he was prepared to admit that there had been complaints which were well founded; but they were due to the special difficulties which the Company had had to encounter in meeting the increasing consumption. The mains had been laid down in anticipation of a much smaller consumption; and the works were very much crowded.

Mr. W. C. Young, Public Analyst for Poplar, Whitechapel, and St. Georges-in-the-East, and formerly Gas Examiner to both the Walthamstow and Leyton Councils, said he was now one of the Gas Examiners for the Corporation of London. He considered the statutory obligations, both as to purity and quality of the gas, very low. Under the test of the 1871 Act, all that the Company were required to do was to get the gas free from sulphuretted hydrogen. The three-minute test afforded no indication whatever as to the absence or presence of other sulphur compounds which were equally objectionable. As a standard, it was quite obsolete. The products of combustion of sulphur compounds other than sulphuretted hydrogen were the same as the products of combustion of sulphurous acid, which was rapidly converted into sulphuric acid. The effect of their presence in a room, was to rot the walls and hangings, discolour the paper, &c. On the other hand, the Metropolitan test, instead of being for three minutes only, extended over fifteen to twenty hours. As in West Ham and London generally the candle power was 16. He saw no reason why it should not be the same in Walthamstow. At Brentford, 14-candle gas through an argand burner gave a 16-candle light; but, as a matter of fact, the Company found it was necessary to make gas of 16 to 17 candles in order to satisfy the Local Authorities. Common experience showed that the use of water gas caused incrustation on the burners. On the question of a testing-station away from the works, witness said that, however honest the engineer of the works might be, the public and the consumers were not satisfied that the gas examiner was always supplied with a fair sample of the gas.

In cross-examination by Mr. Baggallay, witness admitted that he had stated in evidence given in favour of the Company, when they were summoned for supplying gas below the standard, that it was necessary to make corrections for barometric pressure in order to obtain an accurate reading. He advocated that the candle power should be increased from 15 to 16, as tested by a "London" argand burner. Witness said he desired to see enforced in the Lea Bridge district a similar provision with regard to purity as was contained in the West Ham Act; but he admitted that the Crystal Palace Gas Act provision, allowing a margin of 2 grains within which the Company could work, would be reasonable.

Upon this, Mr. Claude Baggallay, on behalf of the promoters, said they were prepared to accept practically the West Ham clause with the modification as to the sulphur figure—something under 25 grains, with a 2-grain margin either way.

Mr. E. H. Stevenson said that the present producing capacity of the gas plant was at least 650,000 cubic feet per day, after allowing the usual percentage. In addition to this, each half of the water-gas plant was equal to a production of 350,000 cubic feet. The rest of the apparatus—the purifiers and washers—were not able to deal with a larger quantity than the 350,000 cubic feet. If, therefore, the water-gas plant was used to such an extent that the resultant gas would contain 33 per cent. of water-gas, the capacity of the works would be 1 million cubic feet per day. The present maximum output was 640,000 cubic feet, and the average about 530,000 feet. If no additions were made to the existing plant, except as regarded washers and scrubbers, it was, in his opinion, adequate to meet the growing demands of the district for the next two or three years. Mr. Cross had admitted that the scrubbers and washers could be made efficient for about £600. At the end of the three years, the Company would have to begin to increase their works, if the consumption grew at its present ratio. If he were managing the works, he should begin to consider their enlargement at the end of two years. If the Bill were rejected, and the Local Authorities obtained power next year to purchase the works, the supply of gas in the district would not be at all prejudicially affected meanwhile. He thought now that the Company were at the end of their tether as regards capital, there could not be a more favourable opportunity for the transfer, both in the interests of the consumers and of the shareholders themselves. If the Company were bought up now, their value would be unaffected by electric light competition. On the question of the provision of a testing-station away from the works, witness said that when he was examining the New York Mutual Gas Company's works—a Water-Gas Company—he found that between the gas-works and the City Hall (a distance of 2½ miles), there was a difference of 3½ candles. It would be, of course, unusual to find such a drop as that in coal gas. If there was a fluctuating gas, as had been shown in this case, the gas would not burn well in cooking-stoves. He contended that, taking into consideration the £25,000 of capital now being spent, the capital cost per million cubic feet sold was nearer £1000 than £900; and according to "Field's Analysis" the Lea Bridge Company compared very unfavourably with other similar Companies round London, in the matter of working expenses. The Tottenham and Edmonton test as to purity was more stringent than that imposed on the West Ham Company, which was a reasonable test. If the undertaking continued in the hands of the Company, it would no doubt develop into a large concern, and therefore ought to be put under the same restrictions as the larger Company.

Witness was cross-examined by Mr. Baggallay to show that the premiums on the new capital would about balance the lower rate at which the Corporations could borrow the money and make the sinking fund provision. Witness, however, pointed out that at the end of 30 or 40 years the ratepayers would be in possession of the works, free of all capital charges. He admitted that if the Company used the water gas as he proposed, they would be employing 8 per cent. above the limit recommended by the Water Gas Committee.

This concluded the evidence against the Bill.

Mr. Pembroke Stephens, in addressing the Committee for both Local Authorities, pointed out that the Company had not been in Parliament for 21 years; and when they came the story was that their capital was absolutely exhausted, and the works inadequate. He asked the Committee, before granting the Company a new lease of life, to seriously consider how the old powers had been used. From both the districts of Walthamstow and Leyton there had been evidence showing complete accord as to the unsatisfactory working of the Company in the past. It had been shown that, even with their exceedingly low illuminating power of 14 candles, the Company had been unable to give a steady light; while the price charged had been high. The Company had had to be forced into making reductions in price, and they had been summoned for supplying gas below the standard. There was no very great urgency about the re-arrangement of the existing capital, or the Company would have done it before. The great contention of the Company had been the necessity for storage; but there was no doubt that they had power to use the lands already in their possession for storage purposes. Counsel then dealt with the high capital expenditure and the working cost, and said that the alteration of the standard for gas had been put upon them by the other House, and not on their own initiative. Notwithstanding that the people they had to supply would readily use slot meters, there were only two of these contrivances in the district. He asked for the rejection of the Bill, or, if it were passed, that the Committee would insert a purchase clause similar to that put into the Airdrie and Coatbridge Bill this session. He instanced, as precedents for such action on the part of the Committee, the Redhill and Reigate, Morley, Loughborough, Skipton, Newtown, and other cases.

On Mr. Baggallay rising to reply for the promoters, the Chairman intimated that the Committee thought he might confine his remarks to the question of purchase.

Mr. Baggallay then refuted the assertion of Counsel for the petitioners that the increased candle power had been put upon them by the other House, and quoted the proceedings to show that the Company had voluntarily accepted 15 candles as the standard. Dealing with precedents, he said that the Airdrie and Coatbridge case was no precedent at all, because that was a water undertaking; and Parliament had always recognized that gas and water must be dealt with differently—the latter being an essential of life. In the Airdrie and Coatbridge case, also, the Company were willing sellers. On a purchase clause being put into the Redhill and Reigate case, the Bill had been withdrawn. That was a case where a statutory Company desired to purchase a non-statutory Company. Counsel then dealt in detail with the other precedents mentioned by Mr. Pembroke Stephens, and said that, except in the case of the Redhill and Reigate, where the compulsory clause got as far as being inserted by one House, there was not a single instance where Parliament had inserted compulsory purchase clauses in the Bill of a statutory Company on the petition of the local authority. Having dealt with precedents, Counsel was proceeding to address the Committee on the merits of the question in this particular case, when

The Chairman, after a short consultation with his colleagues, said the Committee had decided that the preamble was proved; and they rejected the purchase clause.

The consideration of clauses was postponed till to-day (Tuesday).

THE CONTEST FOR THE DERWENT WATERSHED.

The Consolidated Bill before the Standing Orders Committee.

Mr. Campion, one of the Examiners of Petitions for Private Bills having reported non-compliance in the case of the Derwent Valley Water Bill (see *ante*, p. 59), the matter came on Monday last week before the Standing Orders Committee of the House of Lords, consisting of the Earl of Morley, the Earl of Lauderdale, Viscount Knutsford, Viscount Hawarden, and Lord Monkswell. Mr. Cooper, Parliamentary Agent, asked, on behalf of the Corporations of Sheffield, Derby, Leicester, and Nottingham, and the Derbyshire County Council, that compliance with

the Standing Orders might be dispensed with. He stated that the Bill came before the House of Lords in its present form as the result of an express instruction from the House of Commons to Sir J. Brunner's Committee to consolidate the three Bills promoted by the Corporations of Sheffield, Derby, and Leicester; and, so consolidated, the Bill contained power to constitute a Joint Board for the purpose of constructing certain works in order to enable the head waters of the Derwent to be appropriated for supplying the places and districts above specified. The view of the Committee of the House of Commons was that the administration of so large an area ought to be in the hands of the Corporations and bodies principally interested in the watershed; and it was because they were of opinion that the Consolidated Bill carried out their views in this respect that they passed it. It would be unseemly on his part to ask their Lordships to go behind the decision of the Examiner; but he contended that there had certainly been no *laches* on the part of the promoters in not providing for the constitution of a Joint Board. The Earl of Morley remarked that he did not suppose the opponents would say the promoters had been guilty of *laches*. Mr. Soutter, Parliamentary Agent for the Nottinghamshire County Council, said they simply urged that the Joint Board was never contemplated in any of the original Bills, and was not covered by the notices. Mr. Cooper said, on the contrary, it was contemplated in two of them—the Sheffield and Leicester Bills. He put it to their Lordships that the interests of the Corporation of Nottingham were not such as to outweigh the considerations which induced the Committee of the House of Commons to pass the Consolidated Bill; and he again asked that the Standing Orders should be suspended, so that a scheme, which had already cost an immense amount of money, and involved large and important interests, should be submitted to the consideration of a Select Committee of their Lordships' House, before whom the Nottinghamshire County Council would have an opportunity of trying their case. Mr. Soutter having repeated the arguments he presented to the Examiner in support of his contention that the Standing Orders had not been complied with, by reason of the insufficiency of the notices, the room was cleared. On the re-admission of the parties, the Earl of Morley said that the Committee were of opinion that this was a case in which the Standing Orders should be suspended, and the Bill allowed to proceed.

The Ossett Corporation and the Gas-Works.—The statutory poll of the owners and ratepayers of Ossett upon the question of whether the Corporation shall promote a Bill for the purchase, compulsorily or otherwise, of the Ossett Gas Company's works and undertaking, has been taken; and the result was announced last Thursday, as follows: For the Bill, 1407; against, 1085—majority for, 322. The result is in accordance with the show of hands at the public meeting.

Leeds Corporation Gas Committee and their Pipe Layers.—Moving the adoption of the proceedings of the Gas Committee at the meeting of the Leeds City Council last Wednesday, Alderman Lowden stated that they would have to pay more for coal this year, but they did not intend advancing the price of gas. In reference to demands by the pipe-layers, the Committee were willing to grant them an eight-hour day, provided they started work rather later, and only had one interval during the day for meals, the end of the eight hours to terminate on the job. The men wanted the eight hours to terminate at the workshop; but this the Committee could not see their way to grant. The motion was agreed to.

Gas Profit Prospects for the Current Year at Rotherham.—The Rotherham Corporation had before them last Wednesday the minutes of the Gas Committee which recommended a number of improvements in connection with the gas-works—viz., new show-rooms, workshops, stores, valve-house, blacksmith's shop, and coal-testing plant. Mr. Gummer, in moving the adoption of the minutes, said it was necessary the Council and the public should know that the gross sum the Committee expected they would have to pay for coal carbonized in the next twelve months would be about £1800 in excess of what they paid during the past year. They hoped to recuperate themselves to some extent from the increased value of residuals. At the same time, they would have to look to the next year as one of very small profits. Alluding to the extensions, he said they were part of the general scheme—and, when completed, the Council would have gas-works second to none in the kingdom. The motion was adopted.

Mr. Charles Sellers on Incandescent Gas Lighting.—Whenever Mr. Charles Sellers, the Engineer and Secretary of the York Gas Company, has a chance of speaking to the Company's employees collectively—whether at the "festive season" or on the occasion of the annual dinner—he always has something interesting, instructive, and encouraging to tell them. Presiding at the last-named function, held at Whitby on the 1st inst., he took the opportunity, when proposing the toast of "Prosperity to the York United Gaslight Company," of offering a few remarks on incandescent gas-burners. He said the term "evolution" was often used in connection with scientific development, but he did not know any industry to which the term could be more closely applied than to the development of the various uses of gas since its introduction by Murdoch in 1803. It started then in Birmingham at a charge to the public of 13s. per 1000 cubic feet, and at the same price in York in 1823; and he need not say that between that figure and the York Company's present charges of 1s. 8d., 1s. 9d., and 1s. 11d., according to consumption, there was evidence of marvellous progress. But this was not all. Step by step improvement in the manufacture of gas-burners showed another marvellous evolution in scientific construction, producing, as modern burners did, so much more light out of so much less gas consumed. The advance from the rat-tail or the single-jet burner to the incandescent use of gas, as developed in the Welsbach burner, showed another marvellous progress in evolution in connection with gas lighting; and we were apparently on the eve of further developments. Having referred to the light-giving power of the Voelker mantle, which the Company had recently shown at their offices, Mr. Sellers said that when the market was opened for free trade in incandescent burners and mantles, the public might rely upon it that there would be plenty to choose from; and they might also rest assured that science had not exhausted her evolutionary powers in the inventions of these burners and mantles.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE.—CHANCERY DIVISION.

Friday, July 7.

(*Before Mr. Justice* Byrne.)

Welsbach Incandescent Gas-Light Company, Limited, v. New Sunlight Incandescent Company, Limited.

Mr. Bousfield, Q.C. (Mr. W. Neill with him), moved on behalf of the defendants for an order restraining the issue of an advertisement which the plaintiffs had published with reference to the above action while it was pending, or, in the alternative, for a sequestration in respect of the circular as being contempt of Court. He said the defendants were commonly known as the Sunlight Company, and his Lordship would remember that a short time ago he had before him an action in which the Daylight Company were defendants. This action was brought on the Welsbach patent of 1885, and the mantle being one composed of zirconium and 0·5 per cent. of cerium. His Lordship gave judgment that the small quantity of cerium gave the Welsbach Company the right to say that the Daylight Company were infringing. The action against the Sunlight Company, however, had absolutely no relevance to that decision, as their mantles were of thorium and cerium; and the action was brought against them on the 1886 patent. The plaintiffs had advertised a "Caution," stating that the "warning of the Welsbach Incandescent Gas-Light Company, Limited, against buying, selling, or using Daylight Company's mantles, Sunlight Company's white mantles, has been proved to be justified, so far as the Daylight mantle is concerned, by the recent judgment of Mr. Justice Byrne," and that they would "now push on with the action against the New Sunlight Incandescent Company, Limited; and they are advised that a similar judgment will be obtained against that Company." He (Counsel) contended that the effect of this on the public would be to inextricably confuse the Daylight and Sunlight Companies and their mantles. He submitted that, pending the trial of the action, the Court should not allow an advertisement of this sort to be issued.

Mr. T. Terrell, Q.C., who (with Mr. A. J. Walter) appeared for the plaintiffs, read a circular which had been issued by the defendants, and said it was the issue of this which led to the advertisement of the plaintiffs.

Justice Byrne expressed the opinion that neither the plaintiffs' advertisement nor the circular of the defendants was fair; and he suggested that the proper course would be for the parties to come to an arrangement to withdraw both, and insert proper advertisements.

After considerable discussion, it was agreed that both the plaintiffs' advertisement and the defendants' circular should be withdrawn, without prejudice to issuing others—the parties to pay their own costs.

The Charge Against a Gas Company's Secretary.

At the Holmfirth Police Court, Henry Walter Hodges, formerly Secretary of the New Mills Gas Company, was recently charged with embezzling various sums amounting to £8 4s., the property of the Company. Evidence was given that the money had been handed to the prisoner, who had given receipts for it, but had not paid it into the bank. The Bench decided to deal summarily with the case, and the accused pleaded "Guilty." A strong appeal was made on his behalf by Mr. Turner, who gave a sketch of the prisoner's career. His disappearance early in May was explained by the fact that he went to America to look after some investments in which he was interested; and on his return he gave himself up. There was no suggestion that there had been falsification of the books; and he (Mr. Turner) ventured to think that if the money in question had been forthcoming, the Company would have been satisfied. He appealed to the Bench to make the punishment as light as possible; and they decided to commit the prisoner for two months.

Increase of Price.—The Eckington and Mosborough Gas Company have raised the price of gas, as from the 1st inst., from 3s. 4d. to 3s. 9d. per 1000 cubic feet, owing to the recent increase in the price of coal and for other reasons.

Reduction in the Price of Gas at Ilkeston.—At the meeting of the Ilkeston Town Council last Tuesday, Alderman Beardsley, in moving the adoption of the Gas Committee's minutes, congratulated the Committee and the Council on the price of gas being reduced to small consumers from 2s. 11d. to 2s. 8d., to large consumers from 2s. 8d. to 2s. 6d., and to the largest consumers from 2s. 7d. to 2s. 5d. per 1000 cubic feet. This, he said, had been in the minds of the Committee for a couple of years; and he thought there was great credit due to the Gas Manager (Mr. F. C. Humphrys) and the Committee in bringing about the reduction. Last year there were 5 million cubic feet more gas made than in the previous year; and if they could go on increasing the consumption they might anticipate at the end of the next twelve months a surplus equal to the £687 that had been made as profit this year. Mr. Scattergood, in seconding the motion, mentioned that the penny-in-the-slot consumers would have 26 instead of 25 cubic feet of gas for 1d. Alderman Sudbury, while congratulating the Committee on the reduction they had made, said he thought it would have been better if it had been 3d. per 1000 cubic feet all round. They must not forget that the town was the largest consumer by far; and if they charged less to the town, it only came out of the rates. It was simply taking money out of one pocket and putting it into another. Mr. Chambers explained that the additional 5 million cubic feet of gas last year were made from carbonizing the same bulk of coal as in the previous year, which meant a considerable profit. By adopting regenerative furnaces, they had not only done this, but had sold 1000 tons more coke than in the previous year, which was another source of profit. The foresight of the Gas Manager and the Committee had been widely exercised; and they had spent the money to the advantage of the town. Mr. Trueman proposed, as an amendment, that the price should be 2s. 8d. up to 150,000 cubic feet, and 2s. 6d. above that consumption; but it did not find a seconder, and the minutes were adopted.

MISCELLANEOUS NEWS.

THE GAS AND WATER ORDERS OF THE SESSION.

The Board of Trade have issued the usual memoranda stating the nature of the proposals contained in the Provisional Orders included in the Gas and Water Orders Confirmation Bills of the present session. There are two Bills containing Gas Orders, one comprising Gas and Water Orders, and the fourth is confined to Water Orders only.

The first Gas Orders Bill contains Orders relating to Alton (Hants), Bedworth, Elstree and Boreham Wood, Limavady, and Wellingborough. The Alton Order is simply to empower the Gas Company to acquire further lands and construct additional works. The Bedworth Order is to authorize the Bedworth Gas Company, Limited, to maintain and continue gas-works, and to manufacture and supply gas in the parish of Bedworth and part of Astley, in the county of Warwick. The share capital is limited to £11,000, consisting of £3192 of original ordinary, £1808 of original preference, and £6000 of additional capital; and the loan capital to one-fourth of this amount. The maximum price to be charged for gas is fixed at 5s. 3d. per 1000 cubic feet, with power to the Board of Trade, after the expiration of three years, to alter it, or to substitute a standard price, with the sliding-scale. By the Elstree and Boreham Wood Gas Order, the share capital of the Elstree and Boreham Wood Gas Company is limited to £16,000, consisting of £6940 of original ordinary, £3060 of original preference, and £6000 of additional capital; and loan capital to one-fourth of this amount. It is provided that, after the expiration of three years, the Board of Trade may, if they think fit, alter the authorized maximum price of 6s. per 1000 cubic feet, or substitute a standard price with sliding-scale. The Order will authorize the sale of gas in bulk, by agreement, beyond the limits of supply. The Limavady Order will empower the Limavady Gas Company to maintain and continue their works, and manufacture and supply gas within the town of Limavady, in the county of Londonderry. The share capital is limited to £2500, and the loan capital to one-fourth of this amount. The maximum price to be charged for gas is 6s. 3d. per 1000 cubic feet, with the usual power to the Board of Trade. The Wellingborough Order will empower the Wellingborough Gas Company to raise additional capital, not exceeding £40,000, by shares, and one-fourth of this amount by loan.

The second Gas Orders Bill contains Orders relating to Farnham, Freshwater, Morecambe, and Newtown and Llanllwchaiarn. The Farnham Order is to empower the Farnham Gas Company to construct, maintain, and to continue gas-works, and to manufacture and supply gas in the parishes of Farnham and Farnham Rural, in the county of Surrey. The share capital is limited to £27,200, consisting of £19,200 of original and £8000 of additional capital; and the loan capital to one-fourth of this amount. The Order authorizes the sale of gas in bulk by agreement beyond the limits of supply; fixes the maximum price to be charged for gas at 3s. 9d. per 1000 cubic feet, with the usual power to the Board of Trade; and provides for the sale of the undertaking, under certain circumstances, to the Farnham District Council. The Freshwater Order is to enable the Freshwater Gas Company to construct and maintain gas-works, and make and supply gas within the townships and parishes of Freshwater and Totland, in the Isle of Wight. The share capital is £12,000, and the loan capital one-fourth. The Company are to be authorized to sell gas in bulk, by agreement, beyond the limits of supply. The maximum price to be charged for gas is 5s. per 1000 cubic feet, with the usual power to the Board of Trade; and the Company are, under certain circumstances, to sell their undertaking to the Isle of Wight Rural District Council. By the Morecambe Order, the Morecambe Gas Company are to be authorized to raise additional capital to the amount of not more than £16,000 by shares or stock, and £4000 by loans. The Newtown and Llanllwchaiarn Order is to empower the Newtown and Llanllwchaiarn Gas Company to maintain and continue gas-works, and to manufacture and supply gas in the urban district of Newtown and Llanllwchaiarn, in the county of Montgomery. The share capital is limited to £21,000, consisting of £15,000 original and £6000 additional capital; and the loan capital to one-fourth—the latter being subject to the auction clauses. The Order will authorize the sale of gas in bulk, by agreement, beyond the limits of supply; fix the maximum price to be charged for gas at 4s. 7d. per 1000 cubic feet, with the usual power to the Board of Trade; and provide for the sale of the undertaking to the Urban District Council of the above-named places.

There are four Orders in the Gas and Water Orders Confirmation Bill, relating respectively to Herne Bay, Hoylake and West Kirby, Tonbridge, and York Town and Blackwater. The first-named Order relates to gas, and it is to empower the Herne Bay Gas Company to maintain and continue gas-works, and to manufacture and supply gas within the parish and urban district of Herne Bay, and the parish of Herne, in the county of Kent. The share capital is limited to £36,000, consisting of £16,000 of original and £20,000 of additional capital; and the loan capital to one-fourth. The Order will authorize the sale of gas in bulk, by agreement, beyond the limits of supply; fix the maximum price to be charged for gas at 4s. 2d. per 1000 cubic feet, with the usual power to the Board of Trade; and provide for the sale of the undertaking to the Herne Bay District Council. The second Order relates to the supply of gas and water, and it will empower the Hoylake and West Kirby Gas and Water Company to raise additional capital for their undertakings—namely, additional gas capital not exceeding £5000 by shares, and additional water capital not exceeding £7000 by shares, and one-fourth of the respective amounts by loan. The Tonbridge Order will authorize the Tonbridge Gas Company to construct and maintain additional gas-works, and supply gas within extended limits; raise further capital not exceeding £30,000 by shares or stock, and one-fourth of this amount by loan; authorize the sale of gas in bulk by agreement beyond the limits of supply; and provide that the price within the extended limits shall not exceed by more than 9d. per 1000 cubic feet, the amount for the time being charged within the existing authorized area of supply, subject to a maximum of 4s. 6d. per 1000 cubic feet within the extended limits. The York Town and Blackwater Order will empower the York Town and Blackwater Gas Company to purchase certain lands by agreement, construct additional works, and raise further share capital not exceeding £8000, and loan capital not exceeding one-fourth of this amount.

The Water Orders Confirmation Bill contains Orders relating to Burnham (Essex), Harpenden, Maidstone, Stourbridge, and Tilehurst. They are all to authorize the raising of additional capital, the amounts of which are not stated; but in the case of the Stourbridge Order, the Water Company will be empowered to extend their limits of supply.

THE INSPECTION OF GAS LIQUOR AND OTHER WORKS UNDER THE ALKALI ACTS.

The Sub-Inspectors' Reports—The Chief Inspector's Report for Scotland.

We conclude to-day the notice commenced June 27 of the reports of the Sub-Inspectors under the Alkali, &c., Works Regulation Acts, 1881 and 1892, for the past year; and give some extracts from the Chief Inspector's report for Scotland.

In the East Midland district, over which Mr. E. Morley Fletcher has jurisdiction, one new works for the manufacture of sulphate of ammonia appears on the register. The liquor used is derived from coke-ovens; but the type of oven was not found suitable for the recovery of the bye-products, and so for the present the manufacture has been abandoned. The erection of coke-ovens with recovery plant will shortly make an increase in the bulk of gas liquor distilled in the district. The total quantity of ammoniacal products manufactured during the year amounted to 13,169 tons calculated as sulphate of ammonia. The proportion distilled to liquor ammonia was 35·24 per cent., compared with 35·87 per cent. in 1897.

Mr. Fletcher has nothing fresh to report as to the manner of revivifying oxide *in situ*. At one works, where air is drawn through the oxide by means of a pump, success has not yet been attained. The oxide is spoilt through over-heating; but the method is still being experimented with—steam now being introduced to keep the oxide moist and absorb the heat. Referring to the various methods in use for the disposal of the sulphuretted hydrogen, the following are the proportions given in terms of sulphate made: To vitriol-chambers, 29·9 per cent.; by Claus process, 37·1 per cent.; by oxide purification, 28·3 per cent.; by combustion, 4·7 per cent. The distillation of tar is carried on in 15 works, though the erection of one was only completed at the close of the year, and is not included in the number on the register for 1898. Treatment of the worm-end gases and of those from the pitch coolers remains the same. Tests were made at two of the larger works to ascertain that combustion of the gases was complete, and no trace of sulphuretted hydrogen was found escaping.

Mr. E. Jackson presents an interesting report on the South Midland district, in which there are 79 works for the manufacture of sulphate, muriate, and carbonate of ammonia, also of anhydrous ammonia, and for the concentration of gas liquor. In several works more than one of these processes is carried on. In 60 works, the sulphate plant is connected with ordinary gas plant; in 6 the liquor is derived from carbonizing (coal) plants; in 11 it is purchased from neighbouring gas-works; and in 2 it is derived from coke-ovens. In two works the sulphate plant is in connection with recovery of products from the blast furnaces at iron-works. At two of the works referred to above, where liquor from carbonizing plants is worked, some is also worked along with it from neighbouring gas-works. The methods of dealing with the sulphuretted hydrogen generated are the same as described in previous reports. An increasing number of works now intercept the offensive "devil liquor" from the condenser, and deal with it by one of the following methods: (1) Separate still for distilling the liquor, the sulphuretted hydrogen passing along with the foul gases from the sulphate still; (2) returned direct to the sulphate still with the ordinary gas liquor; (3) returned to the crude liquor well; (4) returned to the gas-works scrubber.

New sulphate plants have been erected at several works. At the two works referred to in last year's report where the combustion method of dealing with the sulphuretted hydrogen was still employed, this plan has now been discontinued. At one of them there was considerable delay in erecting the new sulphate works; and a heap of oxide was employed to arrest the sulphuretted hydrogen, as a temporary plan, in place of burning in the retort flues. At the other, condensers and two purifiers fitted with hydraulic valves have been connected to the sulphate plant; the sulphuretted hydrogen being formerly burnt in the retort flues. In his report for the year 1895, Mr. Jackson referred to a new saturator introduced by Mr. Alfred Colson, of Leicester.* As it has been in use for a sufficiently long time to test its value and practicability on many points, Mr. Jackson wrote to Mr. Colson for information on the matter; and he received the following reply: "I am pleased to say that this piece of apparatus has even surpassed my expectations. It has now been at work for nearly five years, during which time it has produced 7000 tons of salt. No difficulty whatever has been experienced in working it; it being very easily controlled and managed. The total cost of repairs during the whole time it has been in operation has only been £13. As it is closed, not only is it more sanitary than the usual form of saturator, but the salt, being delivered by gravitation, considerably reduces the cost of manufacture, and dispenses with all heavy labour. When only making 50 tons per week, labour, as compared with that required in the working of the ordinary saturator, is reduced by at least one-third. At the present time, I am making, with this saturator, 70 tons of salt per week; and even this quantity, I believe, does not represent its limit. The increased quantity, of course, further reduces the cost of labour, as no more is needed than that required for the smaller make." The total quantity of liquor distilled last year in Mr. Jackson's district, expressed as sulphate, was 23,128 tons; 96·4 per cent. of the liquor being treated by the continuous process. The sulphuretted hydrogen is dealt with mainly by methods which involve its arrest and utilization; but in many cases oxide of iron or lime purification is used. The distillation of tar was carried on in 23 works last year; being an increase of two compared with 1897. The methods for dealing with the worm-end gases were practically unchanged.

Dr. A. C. Fryer has to superintend an additional works for the manufacture of sulphate of ammonia in his district, comprising the South

* This apparatus was described and illustrated in the "JOURNAL" for June 30, 1896, p. 1463.

West of England and South Wales; making the number 63. He has nothing special to report in regard to them. There are two Claus sulphur-recovery plants; the exit gases from the kilns being dealt with by means of limestone scrubbers and oxide of iron purifiers. The output of sulphur from one of these plants was reduced nearly 45 per cent. on account of the manufacture of water gas. The distillation of tar is carried on at ten works; and no loss of life or serious accident took place during the year. The methods described in previous reports for dealing with the gases escaping condensation at the worm are still adopted. About 50 per cent. of these gases are absorbed by oxide of iron; and the remaining quantity of the worm-end gases is burnt either at the boiler or in a special furnace. Two sulphate of ammonia works were removed from the register in respect of Mr. F. Napier Sutton's district, comprising the eastern and south-eastern counties, in the past year; and two were added. In the former case, a small provincial gas-works ceased to make sulphate, and the manufacture in the other was centralized at a second works belonging to the same Company. Mr. Sutton's report is, as usual, of much interest; and we give the principal portions of it, as follows:—

The chief source of the ammoniacal liquors treated in the district is the carbonization of coal; but a small and decreasing quantity of ammonia is derived from the carbonization of bones for animal charcoal. The products made consist mainly of sulphate of ammonia; but carbonate and nitrate of ammonia, liquid (refined) and anhydrous ammonia, are also made. The total quantity of ammoniacal compounds produced during the year 1898 amounted to 44,425 tons, calculated in terms of sulphate of ammonia; showing a small increase of 284 tons on the quantity produced in the previous year.

The two new sulphate plants registered in the course of the year belong to small provincial gas-works; and distillation on the continuous principle, with absorption of the foul gases in oxide of iron, is practised. The methods in use for the disposal of the sulphuretted hydrogen evolved in the distillation of gas liquor remain as before; and some further change in the proportion of gases dealt with by the various methods has occurred. But the amount treated by combustion *per se* unfortunately does not show the great decrease which was expected. Pressure towards this desirable end has not been in any way relaxed; and the adoption of new and improved methods of treatment are taking place in several of the large works at which the gases have been burnt in retort flues in the past.

The new method recently advocated and tried of neutralization of the sulphurous acid produced by combustion of the sulphuretted hydrogen, has been accepted at five works, and plant for the purpose has been erected; but at three of these the system has not yet been actually put into use, and meanwhile the foul gases have been disposed of as hitherto. The neutralization method and the plant required were discussed at some length in the previous annual report; and another year's observation of the system has given opportunity for gaining further knowledge, both of its merits and of certain difficulties which have arisen owing to defects in the construction of plant. The experience of the past year has been very valuable, and the conditions required to ensure success are now clearly understood. Only one neutralizing scrubber has been at work throughout the year, and this was started early in February last. The average results of the tests obtained have been satisfactory; and these will probably be still further improved when the alterations now in progress for perfecting the water-flushing apparatus on the tower are complete. The greatest percentage condensation obtained at any one time was 98·4; and the smallest amount of acid passing away to the chimney was 1·5 grains of sulphur trioxide per cubic foot.

The essential factor in the use of the combustion and neutralization method is the command of adequate draught, for on this depends the complete oxidation of the sulphuretted hydrogen into sulphur dioxide. With insufficient draught there is liability, or rather certainty, of deposition of sulphur in the connecting-pipes, resulting in further decrease of draught. The use of small boiler-house chimneys is not to be recommended; but connection with a retort-house flue or chimney should give the vacuum required. It may also be pointed out that it appears better to convey the gases from the sulphate plant some distance to a furnace and tower in close proximity to the source of draught, than to depend upon long connection between the neutralizing tower and the draughting chimney. Efficient cooling of the furnace gases is also necessary; and this readily occurs by radiation from a not very great length of iron connecting-pipe or any suitable iron vessel interposed between the furnace and the scrubber. The gases should enter the latter at a temperature not exceeding 100° Fahr., otherwise decomposition of the bisulphite of lime formed by the interaction of the sulphur dioxide and limestone is liable to occur, with evolution of sulphurous acid; thus undoing the work intended to be accomplished. Another requirement is a periodic water-flush on the scrubber, to mechanically assist the washing off of the coating of bisulphite formed on the stone, and to expose a fresh surface of carbonate to the action of the gases.

The question has sometimes been asked as to how much limestone is required to neutralize the acid yielded from the combustion of the sulphuretted hydrogen from a given quantity of liquor. The quantity of volatile sulphur in the average London gas liquor may be taken at 0·35 per cent. of sulphur; and such average liquors would yield about 7·6 per cent. of sulphate of ammonia. Assuming the use of such a liquor, the sulphur gases yielded on distillation and combustion would theoretically require 1·44 cwt. of limestone per ton of sulphate of ammonia made. In actual practice, the amount would not be so much; but taking the cost of Derbyshire limestone delivered on the works in London at 15s. per ton, the cost for stone would be about 1s. 2d., or probably nearer 1s. per ton of sulphate made, provided complete and continuous neutralization is effected.

It was anticipated that the quantity of sulphuretted hydrogen disposed of and utilized for sulphuric acid manufacture would show a further increase during the year 1898; and this has actually occurred to the extent of an additional 5 per cent. The method has now been adopted at seven works, and the proportion of sulphuretted hydrogen now utilized in this manner amounts to 67·1 per cent. of that evolved in the district. The latest works at which this method has found favour belongs to another of the large London Gas Companies, who early in the year acquired acid works belonging to a private firm, in close proximity to the Company's works. The Claus sulphur-recovery process had previously been used by the Company for the disposal of the waste foul gases; but the process was abandoned for direct conversion of the sulphuretted hydrogen into sulphuric acid. The gases are passed some 600 yards through underground pipes to the pyrites burners. No motive power other than that obtained by the pressure in the saturators is found necessary.

The use of the Claus sulphur-recovery process shows some diminution, both in the number of works at which it is employed, and the proportion of gases treated thereby. The chambers have, in general, been maintained in a sound condition of repair, and the waste gases passing the neutralizing tower for the catch purifiers have had a reasonably low acidity. The average amount of sulphur dioxide leaving the chambers has been about 19 grains as sulphur trioxide; and the terminal limestone scrubbers have reduced this amount to an average of 3·5 grains of the latter per cubic foot. Frequently every trace of acid is removed from the gases before passing into the oxide purifiers.

The treatment of the gases by oxide purification is in use at 42 works; and the proportion of sulphuretted hydrogen thus dealt with amounts to 8 per cent. The method is most suitable for the smaller works, where the daily and annual make of sulphate does not exceed about 30 cwt. and 200 tons respectively. Twenty-four of the works at which oxide purification is practised have a yield of under 50 tons; at 13 the yield is between 50 and 200 tons; while the latter figure is exceeded at only four works. At the largest of these, oxide purification has now been abandoned for the combustion and neutralization method; but during the past year the purifiers were in use until the necessary plant for the newer method had been erected and perfected.

Revivification of the oxide *in situ* is practised in nine cases, with beneficial results; and it is a matter of regret that the practice is not in more general use. An automatic change-valve for revivification by chimney draught was put into use at one works early in the year; and the active life of the purifiers has thereby been more than doubled. It has been noticed in more than one case that revivification by the chimney draught has sensibly diminished in course of time, until little apparent benefit resulted. An examination of the connecting-pipe between the purifiers and the chimney has invariably shown either a complete or a partial blockage by naphthalene volatilized from the oxide in the purifiers by heat engendered during re-oxidation. At one works the deposition of the naphthalene in the chimney connection is so persistent that a steam-pipe has been fitted for cleaning the pipe at frequent intervals.

The activity of oxide in open purifiers is frequently retarded by exposure to the weather. An excess of moisture in the oxide tends greatly to check the rapid absorption of sulphuretted hydrogen by lowering the temperature of the mass and increasing its density. All open purifiers are the better for overhead protection; and this should take the form of a light span roof, allowing space beneath for manipulation of the oxide during filling or discharging, and free play of air over the surface of the oxide. Purification by oxide has, in general, been carefully and conscientiously carried out; and the purifiers have very rarely been found otherwise than in an active and inoffensive condition.

Disposal of the foul saturator gases by passing them to the hydraulic and crude-gas mains, with subsequent absorption in the coal-gas purifiers, is practised at two works; while treatment by combustion and subsequent neutralization in a limestone scrubber has been in use throughout the year at one works. At a fourth, the sulphur compounds contained in the gas liquors used are mainly retained in the process; and only some 10 per cent. is evolved as sulphuretted hydrogen and burnt in a very dilute form. The proportion of gases treated at these four works by neutralization and other methods amounts to 4·9 per cent. of the total required to be treated in the whole district.

The disposal of the spent liquors in sulphate manufacture, containing lime sludge, is a matter for careful consideration where the works are situated in populous districts and the local sewers are alone available for the purpose. Complete settlement of all suspended matter, and cooling the liquors to below 90° Fahr., is required by the Commissioners of Sewers and the Local Authorities. The usual method in use for ridding the liquors of suspended lime is settlement in a series of underground tanks; but by this means the temperature of the liquors is not greatly lessened, and cooling to the requisite point is generally obtained by mixing with a large volume of cold water before passing to the sewers. The settling-pits have then to be periodically cleaned of the sloppy lime sludge; and disposal of this material is not easy or free from cost, where all refuse has to be removed for many miles by cart or barge. At one of the large sulphate works, situated in the heart of South London, the spent liquors are now treated by a filter-press, which allows of rapid and complete removal of the lime in the form of a stiff cake, occupying little bulk, and easy to handle; while the effluent liquor is perfectly clear, and cooled very effectively. One press is in use, and is worked by one lad during 10 of the 24 hours; and it suffices to deal with the spent liquor produced in the longer period. It is stated that the cost of this treatment is no greater than that of the settlement method, whereas it has many advantages.

The distillation of tar is carried on at 16 works in the district; and something like 115 stills, of various types and capacity, are employed. The methods and appliances in use for the treatment of the waste permanent gases evolved at the worm-end of the distilling plants remain as before. In all cases they are disposed of by combustion, with the exception of one works, at which the gases from six stills are washed and passed into an oxide purifier. Another of Lennard's continuous stills* is now in course of erection at works in the south; and it will supersede the intermittent stills hitherto used there.

Following the Sub-Inspectors' reports is that made by the Chief Inspector (Mr. R. Forbes Carpenter) to Her Majesty's Secretary for Scotland (Lord Balfour of Burleigh), which contains a detailed account, by Mr. W. S. Curphey, of the work done in that part of the United Kingdom. This gentleman states that, of the 126 works registered, 64 are for the manufacture of sulphate of ammonia. One gas-liquor works and one shale-works were closed and removed from the register. A new works was put into operation, and added to the register. This addition to the list of registered works is of interest as the first in Scotland in which residual products are recovered and prepared for the market in connection with the manufacture of coke in specially constructed ovens in lieu of the old beehive form, which is still much used. In gas-liquor works,

* See "JOURNAL," Vol. LXIV., p. 604.

the employment of the continuous form of ammonia still is extending. In two works this style of still has replaced the old intermittent system with corresponding advantages in dealing with the waste gases produced. Improvements were effected last year in five works, for the more effectual prevention of the escape of noxious gases. In shale-works the question of the best form of retort for the destructive distillation of the shale still commands attention; and active efforts for further advance in this direction continue. The utilization of waste steam in the shale-retorts is now general; and the disposal in this way of the steam and noxious gases arising from sulphate of ammonia manufacture effectually prevents any immediate offence from that source. The sulphur present is, however, not finally disposed of, and may be looked for—in part—at all events in those permanent gases used for fuel; whence arises a distinct proportion of the sulphurous acid escaping into the air from the chimneys of these works. The number of works in which tar is distilled is 45—an increase of one over the number in operation in 1897. The continuous system of distillation referred to in the previous report was not in regular operation during the year. No change in the manner of disposing of the residual gases has to be reported.

Mr. Carpenter points out that the ammoniacal liquors obtained in gas-works from the distillation of Scotch coals differ from those of the North and the Midlands of England in containing a much less proportion of ammonia combined with sulphur. He says there are doubtless exceptions to be found; but experience points to the above being the condition existing, as a rule. Consequently the methods recognized across the Border as effective for dealing with the foul gases from sulphate of ammonia manufacture from gas liquor do not lend themselves for adoption in Scotland without modification. Indeed, of these the conversion into sulphuric acid in vitriol-chambers—the sulphuretted hydrogen being used as one source of sulphur supply to the latter—is rendered impracticable to any large extent, on account of the great dilution of the sulphuretted hydrogen by carbonic acid also liberated on neutralization of the ammoniacal gases in the sulphate of ammonia saturator. Among large works in England, if the proportion of sulphuretted hydrogen in the gas is 20 to 25 per cent., this method has found increasing favour.

Mr. Carpenter gives a table showing the constitution of ammoniacal liquors derived exclusively from Scotch coals, which shows that the proportion of sulphuretted hydrogen in the permanent gases was frequently below 10 per cent., and in no case exceeded 12·8 per cent. He says the Claus sulphur-recovery process will not work successfully unless this figure reaches 15 per cent. The reaction between sulphuretted hydrogen and oxygen, with liberation of sulphur, is one which evolves heat, but also requires the maintenance of a certain temperature to bring it about. The experience in England is that, the reaction once set going, the kiln maintains its own heat—that lost by radiation being supplied by the heat of reaction. If, however, the proportion of neutral gases is increased beyond a certain point, these carry away so much heat with them that the temperature falls below that at which reaction takes place more or less completely, and the sulphuretted hydrogen will pass away largely unchanged, and possibly in explosive mixture. It has been the Chief Inspector's object to endeavour to induce enterprising manufacturers to experiment with the process by using a kiln of annular instead of cylindrical form; jacketing it at the same time with a flue conveying waste heat from a retort-house or steam-boiler, so as to prevent loss of heat by radiation, or even to supply heat to promote reaction. He has not, however, been able to carry out suitable experiments, which require to be on a scale larger than that of a laboratory. His attention has therefore been directed to other chemical methods of treating sulphuretted hydrogen. Decomposition by hydrated ferric oxide, already in use in many works in Scotland, both large and small, has presented difficulties on the large scale of working, many of which have been experienced also in English works; but some were not anticipated, and their solution has not yet been reached. The speed of gases in passing through the purifier is a factor of no little moment. The time of reaction is an element to be taken into account; and it has not been found that, because the percentage of sulphuretted hydrogen in the foul gas is less, the sectional area of the purifier can be reduced. The souring of the oxide, the formation of ferrous and basic ferric sulphates, &c. (rendering some of the sulphur unavailable), and the liability to firing, if constant or intermittent revivification *in situ* is used, unless the temperature is reduced by the presence of water vapour, have all been difficulties at times experienced with these dilute gases, as well as with the stronger ones occurring in England.

The suggestion (made by Mr. Curphey) that treatment of the gases by solution of a ferric salt, preferably the sulphate, might prove a solution of the difficulty, has not been adopted by any manufacturer on the large scale, though experiments larger than on the laboratory scale have been made. The idea suggested by him was based on the reaction of sulphuretted hydrogen with ferric salts, by which the iron is reduced to the ferrous state with separation in a solid form of all the sulphur in the gas. The method of regeneration of the ferrous iron to the ferric or more highly oxidized state by means of nitric acid is well known, as is also the regeneration of the nitric acid from its lower oxides by means of air and steam. It was felt desirable to investigate in the laboratory the conditions for obtaining the most complete reaction on the sulphuretted hydrogen. A mixture of about 7 per cent. of this with 93 per cent. of carbonic acid was passed at varying known rates through solutions of ferric sulphate of varied strength and at different temperatures (ferric chloride also being tried); contact of gas and liquid being obtained by use of a bulb scrubber. In the later experiments, two of these were used in sequence, without, however, securing more than 82 per cent. decomposition. There appeared to be certain strengths of solution more favourable to reaction than with solutions either weaker or stronger. While it is true that in the laboratory apparatus complete decomposition was not obtained, Mr. Carpenter has sufficient hope that by the use of a tower or scrubber, offering a more extended surface for contact, better results may be possible. The removal of the sulphur will have to be provided for in planning this; and there are other modes of obtaining the desired opportunities of contact that would not be open to the obvious disadvantages of liability to clog with precipitated sulphur that the employment of a tower would present.

The Chief Inspector goes on to make the following observations: It is known to every chemist who has had to investigate gas liquors that partial oxidation of ammonium sulphide to thiosulphate takes place with sometimes inconvenient rapidity. It is not possible to conduct an examination lasting, perhaps, from 48 to 60 hours, without the composition of the sample differing at the end from the start, unless access of air to the sample is prevented. The withdrawing of portions for analysis and the gradual replacement of liquid by air in the containing vessel is sufficient to start oxidation. The results of examination of ammoniacal liquors from various sources, contributed to a previous report, show how oxidation during condensing and scrubbing operates in reducing the proportion of sulphide to thiosulphate—in fact, the process is so complete in the blast-furnace gases that practically no sulphuretted hydrogen is to be found in the steam from the cracker boxes; and although the analysis of the washed gases returning to the stoves shows extremely little, if any, oxygen present in the free state, enough has existed in the unwashed gases to complete the oxidation of the sulphur combined with the ammonia in the liquors. In this connection, the following particulars were kindly collected for me by Mr. Henry Bumby, Manager of the Coltness Iron-Works, as to the amount of air introduced into the crude-gas main by the return foul main from the tar-stills; air being pumped into the latter to keep down frothing. Of 80 million cubic feet of gases at the exhausters, the record being corrected for "slip," 777,600 cubic feet were air, measured as introduced at the tar-still; making 0·95 per cent. of air in the gas. Mr. Bumby finds in the washed gases no stain to lead paper after two minutes' exposure; while the green gas at the furnace top gives a distinct stain in 10 seconds. Only once, out of many tests made, has a slight coloration after three minutes' exposure been found in similarly testing the gases from the sulphate of ammonia saturator. Sulphur as sulphuretted hydrogen enters into combination in the separated tars, and the flue dust taken from the green-gas main contains 2·15 per cent.—chiefly, apparently, as alkaline sulphides. From 20 to 30 tons of this dust are weekly taken out of the flues. Mr. Bumby, moreover, in recent correspondence, has reminded me that the water used on their washers is already aërated to its maximum capacity by prior use in other processes; so that this contributes to the condition favouring oxidation of the liquors, which in iron-works are of very little strength. I was led by these considerations to endeavour to investigate in the laboratory whether a liquor containing 0·10 per cent. of sulphur as ammonium sulphide could be treated by warm air in a scrubber without appreciable loss of either ammonia or sulphuretted hydrogen. The laboratory experiments showed that the element of time was a weighty factor in reaction. Solution of oxygen from the air proceeded at a greater rate than oxidation of sulphide to thiosulphate. Presence of sulphurous acid retarded rather than promoted reaction; all three compounds—$(NH_4)_2S$, $(NH_4)_2S_2O_3$, and $(NH_4)_2SO_3$—existing in the solution when sulphurous acid was mixed with the air passing into the little tower apparatus. While I still think this method might prove of use under certain conditions, I have no sufficient data on the time factor before me to speak with anything like confidence.

Mr. Carpenter closes his report by remarking that the total amount of ammonia recovered in Scotland in various important industries again shows an increase, though 1896 was the year when the shale-works touched their maximum output. The amount recovered from blast-furnaces again shows a slight increase. Mr. Curphey, in his report, calls attention to the fact that a fresh source of ammonia recovery has established itself in Scotland—viz., from coke-ovens. This, Mr. Carpenter thinks, is not likely to attain the dimensions reached in England, as it is estimated that the total annual produce of coke in Scotland does not reach 500,000 tons. He points out, however, that every recovery plant erected is an addition to the national resources; and he trusts that in the future he will have the pleasure of noting further development. For the present there is only one works registered and dealing with its own residuals; those recovered from another battery of coke-ovens in works in the Lowlands being sent away for other manufacturers to work up. Some of the increase noted in sulphate produced in gas-liquor works is due to the operation of those two coke-oven recovery plants.

WINDING UP OF THE YEOVIL GAS COMPANY.

The First Distribution.

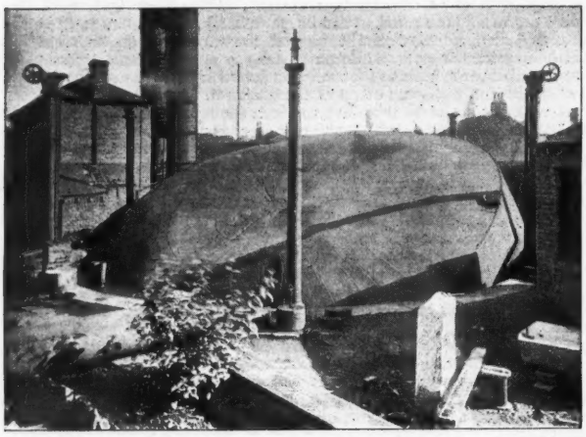
The shareholders of the above-named Company were invited by the Directors to luncheon in the Masonic Hall, Yeovil, on Monday last week, when the Chairman (Mr. E. L. Whitby), gave a *résumé* of the proceedings leading up to the purchase of the undertaking by the Corporation. He did this in preparation for the business meeting, which was to take place shortly afterwards at Victoria Hall. This shareholders' meeting was largely attended. The Secretary (Mr. E. Howell), while reading the minutes of the last meeting, mentioned that the present one was the 65th ordinary assembly which had taken place since the establishment of the works. The first business presented to the meeting was the declaration of a dividend for the past half year, supplemented by a resolution empowering the Directors to make the first distribution of £60,000, or £30 per £10 share; leaving between £24,000 and £25,000 in hand. This, the Chairman explained, would be sufficient to pay all debts and liabilities, and leave a further sum of at least £10 per share to be distributed at a future date. Dr. Dampier Bide moved a vote of thanks to the Directors for the successful manner in which they had conducted the business while selling the undertaking, and at the same time proposed that a sum of £2000 should be voted to them in recognition of their services. This resolution having been seconded and carried, the Chairman and Directors returned thanks to the shareholders for their liberality; at the same time acknowledging the great services rendered to them by their Engineer (Mr. W. A. M'Intosh Valon), who had advised them from the commencement, and to whose judgment and guidance they were greatly indebted for the final result.

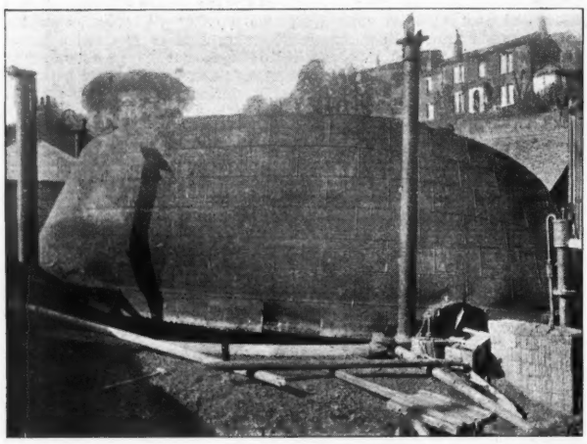
The question of the purchase was referred to at the last meeting of the Yeovil Town Council. The Mayor (Mr. J. Vincent) said some ratepayers were of opinion that the Corporation had given too much for the undertaking. He did not think so; and he was empowered to state that a gentleman would make an offer of £80,000 for the works, if the Corporation were at all dissatisfied with their bargain. Future generations would realize that the Corporation had done wisely in buying the works.

FATAL EXPLOSION AT THE HONLEY GAS-WORKS.

A Gasholder Blown Up.

Last Tuesday afternoon, shortly before three o'clock, an explosion took place at the works of the Honley Gas Company, which unfortunately resulted in the death of four men and serious injury to a fifth. Honley is a small town of about 6000 inhabitants, lying in a pretty valley near Huddersfield; and the gas-works are situated close to the River Holme, not far from the high road leading to Holmfirth, and in the centre of a number of houses. They are under the management of Mr. J. Baldwin, and turn out about 15 million cubic feet of gas a year; the storage capacity being two holders standing 10 feet apart. In view of the increased demand for gas, this was considered inadequate; and the Directors decided to replace one of the holders by a larger one. The holder selected was a single-lift, 48 feet in diameter and 14 feet deep, and capable of holding between 22,000 and 23,000 cubic feet of gas; and its successor was to be a three-lift, of 75,000 cubic feet capacity. The work was placed in the hands of Messrs. R. Dempster and Sons, Limited, of Elland, who sent over four men and a foreman to start removing the holder. This they commenced doing on Monday morning last week. All the gas having, as was supposed, been drawn off, the holder landed upon the rest-stones, with the top at the ground-level. First of all the balance-weights and chains were removed, and then the girders. With the view of starting as soon as possible the work of cutting out the holder, the manhole at the side and a plug in the crown were opened on Tuesday morning





The Wrecked Holder at Honley.

by John Banks, the foreman, to allow of the escape of any gas that might be lurking in the space between the surface of the water in the tank and the crown of the holder. Banks personally drove the first chisel through the steel of the crown; and, under his instructions, the labourers proceeded with the work till dinner time. By about half-past two, two slits, 5 feet in length, and converging to the centre, had been made; and thus additional outlets had been provided for any gas remaining. Just before three o'clock, while five men were on the top of the holder, what is described as a "dull thud" was heard, and the holder, with the unfortunate men upon it, was blown into the air—the men being, it is reported, thrown to a height of 50 or 60 feet, and the water from the tank being driven in all directions. The names of the men are Thomas Carter, John Makin, and Ben Taylor, of Elland, Joe Binns, of Greetland, and Ben Pearson, of Milnsbridge. The first three were employed by Messrs. Dempster; the last was a stoker in the service of the Gas Company. One fell into the yard, and the others were found upon, and at the foot of, the iron staircase of the scrubbers, on the roof of the office, and near the purifying-shed. Carter, Makin, and Pearson were dead; Binns was in such a condition that no hope was entertained of his recovery, and he died shortly after his removal from the works; while Taylor had his thigh broken, and was taken to the Huddersfield Infirmary. The foreman had left the scene only a few minutes before the disaster. Mr. Baldwin was in the town when it happened; and, not hearing any report, he was unaware of the accident till he was informed by a messenger. The effect of the explosion was to snap the guide-rollers and shatter the tops of the columns; but the holder could not have gone entirely beyond the support of the latter, for it fell back into the tank at an angle of about 30°. If it had cleared the columns it must have displaced some in its fall. Three workmen who were within a few feet of the holder when it went up, fortunately escaped unhurt. The force of the explosion being in an upward direction, the second holder, which was full of gas, did not sustain injury; and windows within a few feet of the wrecked holder remained intact. Messrs. Dempster's Works Manager (Mr. A. E. Gibson) visited the scene on Tuesday night, and freely answered any inquiries addressed to him—the calamity having caused a profound sensation in the neighbourhood. Pending the official investigation which will take place, it will not be advisable to put forward any theory as to the cause of the explosion, although Taylor is reported to have attributed it to a spark from a tool. An inquest was opened on Thursday by the District Coroner (Mr. W. Barstow); and, after formal evidence of identification, it was adjourned until yesterday.

The views given of the damaged holder are from photographs kindly sent by Mr. Edward A. Harman, the Engineer and Manager of the Huddersfield Corporation Gas-Works.

GOOLE DISTRICT COUNCIL GAS AND WATER SUPPLY.

The Manager of the Goole Gas and Water Works (Mr. Matt Dunn) has prepared his working statement in connection with the two undertakings for the year ending the 31st of March. Dealing with the gas-works first, he shows that the quantity of coal carbonized was 4552 tons, or 323 tons less than in the preceding year; while the quantity of gas sold was 44,883,669 cubic feet, against 38,424,915 cubic feet, or 3,458,754 cubic feet more. The make of gas was 47,839,000 cubic feet, or 10,509 cubic feet per ton of coal; the sale, 9200 cubic feet per ton, or 87·55 per cent. on the make, compared with 85·63 per cent. before. The gas unaccounted for was 10·50 per cent. of the make, against 13·02 per cent. in the year 1897-8. The total gas-rental was £7302; the sale of coke produced £817; tar brought £402; ammoniacal liquor, £313; and sundries, £185—the residuals and sundries returning per ton, 3s. 7·06d., 1s. 9·22d., 1s. 4·52d., and 9·75d. respectively. The following is a summary of the income over the returns for the previous year: Gas, £818; coke, £310; tar, £129; ammoniacal liquor, £234; and sundries, £119—making a total increase of £1610. The statement relating to the Water Department shows that in the period covered the quantity of water pumped was 158,662,830 gallons, against 150,088,119 gallons—an increase of 8,574,711 gallons; the average daily consumption per head of the population (17,500) being 24·83 gallons, or 1·34 gallons more than in the year 1897-8. The cost of coal was £345 12s. 2d., or at the rate of 0·523d. per 1000 gallons pumped; the wages working out to 0·513d. per 1000 gallons. The total water-rental came to £3119, or 4·71d. per 1000 gallons pumped. There was a net increase of £156 on the water-works; making, with the £1610 extra from the gas-works, a total of £1766.

THE MORTLAKE WORKS OF THE AUSTRALIAN GASLIGHT COMPANY.

At the invitation of the Directors of the above-named Company, the Committee of the Sydney Chamber of Commerce paid a visit on Thursday, the 1st ult., to the Company's works at Mortlake. The party comprised the Chairman (Mr. G. J. Cohen) and Directors of the Company, the Secretary (Mr. R. J. Lukey), and Mr. B. H. Peacock, the Engineer in charge of the works in the absence of Mr. T. J. Bush, who is on his way back to Australia, and the President and Vice-President (Messrs. J. S. Brunton and Gotthelf) of the Chamber, with the Secretary (Mr. H. C. Mitchell) and members of the Committee. A complete inspection of the appliances for the manufacture of gas, from the trucking of the coal from the colliers to the production of the 17-candle power illuminant which the Company supply, took place, and was the more enjoyable from the clear explanations made by the Acting Engineer. Considerable interest was taken in the examination of the labour-saving appliances, by which the Company have been enabled to reduce the price of gas until it is now supplied at 4s. per 1000 cubic feet.

After the inspection, refreshments were served under the presidency of Mr. Cohen. A short toast-list was gone through, including "Success to the Australian Gaslight Company," "The Sydney Chamber of Commerce," and "The Officers of the Company," which were responded to by Mr. Cohen, Mr. A. F. Robinson, Mr. Lukey, and Mr. Peacock. The speeches made in connection with these toasts brought out the following facts: At Mortlake the Company own 80 acres of land, and at Sydney 6 acres. No less than 130,000 tons of coal are used annually, 70,000 tons of coke are produced, and 1400 tons of sulphate of ammonia made—the two last-named products finding a ready sale. In the same time 7700 tons of tarred ashes were turned out. There are 1000 persons employed directly about the works, and a sum of £2000 per week is paid in wages. These figures are irrespective of the work provided outside the process of gas manufacture. The total length of mains is 1250 miles. Penny-in-the-slot meters are already an institution; and the Company find difficulty in meeting the demand for them. By the end of the present year, it is estimated that no less than 3000 of these meters will be in use. In addition to the enormous quantity of city water used by the Company, there is a dam on the property at Mortlake, having a capacity of over 7 million gallons. The largest gasholder at Mortlake cost £43,000, and has a capacity of 3,600,000 cubic feet. Another holder there will contain 2,750,000 cubic feet; and the large one at the Sydney works holds 1,000,000 cubic feet. The progressive policy of the Company is proverbial. As an instance, it was stated, in reply to a question about incandescent burners, that although the price to the public lamps has been reduced, the Company have spent £10,000 in replacing the old jets with incandescent burners and mantles, as a consequence of which the city and suburbs are now lighted as well as, or even better than, any city of similar size.

ELECTRIC LIGHTING NOTES.

An installation of electric lighting was inaugurated in Newington at eight o'clock last Friday evening. It has been provided by the Vestry, and forms part of a scheme for the whole of the district.

The demand for electric lighting at Barnsley will tax the Corporation works to such an extent that they have determined, on the advice of the Lighting Committee, to spend an additional £2000 on new plant.

The St. Helens Electric Lighting Committee are contemplating certain alterations and extensions in connection with their distributing system, which are estimated to cost £3600. The sanction of the Local Government Board to the borrowing of this sum is to be sought.

In connection with the purchase of the local electric lighting works by the Oswestry Corporation, one of the shareholders (Mr. Alfred Wynne Corrie) has written to the Council stating that he will be satisfied with the return of his capital, without any profit on the purchase. The actual relief to the town will be about £2250.

Mr. H. H. Boulnois, of the Local Government Board, held an inquiry at Wigan last Wednesday respecting the application of the Corporation for sanction to borrow £90,000 for electric lighting purposes. It was stated that sufficient promises had been received from intending customers to ensure a yearly profit of £5000. The application was opposed on the ground that the proposed generating house would create a nuisance.

Formal notice has been received by the Dudley Corporation of the intention of the Midland Electrical Corporation to apply for a Provisional Order to supply electricity to a number of districts, including Dudley. The Mayor thinks the Electrical Corporation are presuming a good deal; and his fellow councillors evidently agree with him, for they gave a Committee power to oppose as on previous occasions.

Making a comparison of the electricity and gas undertakings as though they were private Companies, the Mayor of Blackpool (Alderman J. Heap) stated, at last Tuesday's Council meeting, that the Electricity Department had a capital of £102,003; and after allowing a proper sum for depreciation and for a reserve fund, a dividend of 5 per cent. could have been declared. It should be remembered, however, that the undertaking had only been in operation some six years; while the heavy capital was due to so many unexpired patents. The gas-works, on the other hand, had been at work for nearly thirty years. The capital was £127,000; and after the usual allowances were made, a dividend of 13 per cent. could be declared.

Moving the reception of the report of the Electric Lighting Committee (noticed last week) at Wednesday's meeting of the Manchester City Council, Alderman Higginbottom spoke of the rapid progress which had been made in the department. The increase in revenue for the year had been 44 per cent. During the same period there had been an advance of 50 per cent. in the number of electric motors brought into use—a fact which, he remarked, was noteworthy as indicating a lessening of the smoke nuisance. The net profit for the year was £17,188, after putting aside £3344 to a renewal suspense account. There had been a large extension of plant ready for the work of next winter and other requirements. The Committee also intended at an early date to ask the Council's sanction to a reduction in the price of current. The report was approved.

The Electrical Engineer to the Llandudno District Council (Mr. A. H. Preece) submitted a report to that body yesterday week on the question of the necessity of providing new plant to meet the demands for electricity for lighting purposes and for a new light railway. He pointed out that the capacity of the works as designed was to meet a demand from 7000 lamps; and there were already 8000 lamps connected. He recommended the Council to order at once new plant at a cost of £3000, which would enable them to supply 12,000 lamps of 8-candle power. The acceptance of the terms by the Light Railway Company for furnishing them with electricity rendered it necessary to be in a position to supply them. The railway was to be ready next season, and the supply of electricity must be ready at the same time. The cost of the plant needed for the railway would be £8250. The Chairman of the Electricity Committee (Mr. T. T. Marks) informed the Council that, when they commenced to supply electricity on Nov. 5, 1898, they had a connection of 2500 lamps; and at the present time the number was something like 9000. The Council agreed to apply for power to borrow the two sums named.

The electric lighting companies appear to have great faith in the undeveloped possibilities of the small towns in the West of England. One after another these towns learn that they are the subject of attention from people who are determined that they shall enjoy the advantages of electric lighting. In some cases, the Local Authorities have answered these movements by themselves undertaking to supply electricity; but there are several places in which negotiations are going on with companies who are endeavouring to persuade the people that, in order to be up to date, they must have electric lighting in their streets and shops. Dartmouth—the latest town to receive these attentions—has had two communications. One company state that they have given notice of their intention to apply for a Provisional Order, and are willing to put in a special clause giving the Corporation the option of purchase at the end of 14 years; the other, that they are willing to apply for an Order, and will give the Town Council the right of purchase in 21 years. The Council have not yet decided what answer to return to these kind people; but they may not come badly out of the negotiations if it should prove that both companies are in earnest.

Reference was made in the "JOURNAL" a fortnight ago to electric lighting in Adelaide, South Australia. It may be remembered that the South Australian Electric Light and Motive Power Company have agreed to supply to the Adelaide Corporation thirty arc lamps of 2000 (nominal) candle power at 1s. per lamp per annum; the lamps to be lighted from sunset to sunrise every night throughout the year under a penalty of 10s. for each night a lamp is not lit and kept alight. The Company's accounts for the six months ending the 30th of April have been published; and, although the gas-lamps in the streets of Port Adelaide have not been used since January, and the Institute and two shops were for some months lit by electricity, we notice that the profit and loss account is not credited with any income, except £1 2s. 5d. for interest. The occupiers of the two shops referred to have, we learn, already given up electricity and taken to gas lighting. The capital of the Company is £20,000, of which £18,900 has been paid up; and there are sundry creditors to the amount of £244 5s. 4d.—making a total of £19,144 5s. 4d. This sum is accounted for as follows: Deposits with the Adelaide and Port Adelaide Corporations, £2500; land at Adelaide, £2000; Port Adelaide station, £7480; plant, £630 2s. 7d.; undertaking and goodwill, £4334 3s. 10d.; cash in bank,

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 102.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	21½—22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15½—16½	..	4 10 11
300,000	100	July 3	5	Australian 5 p. c. Deb. .	102—104*	+½	4 16 2
200,000	5	May 12	6	Bombay, Ltd. . . .	6½—6¾	−¼	4 8 11
40,000	5	,,	6	Do. New, £4 paid .	4¼—4½	..	5 1 1
380,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	215—220	..	4 1 10
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb. .	126—130	..	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig. .	265—270	..	4 5 2
226,320	,,	,,	8½	Do. A. Ord. Stk. .	194—197	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	46—48	..	4 3 4
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c. .	25—27	..	4 5 11
75,000	10	,,	9	Do. 7 p. c. . . .	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10½	..	5 14 3
220,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102*	..	3 18 5
150,000	20	Mar. 10	8½	Cagliari, Ltd. . . .	28—29	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl 13	13½	Commercial Old Stock .	314—319	..	4 4 8
200,750	,,	,,	10½	Do. New do. .	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	187—192	−3	5 4 2
200,000	,,	,,	7	Do. 7 p. c. Pref. .	182—187	..	3 14 10
51,600	Stk	Feb. 24	14	Croydon A 10 p. c. . .	—	—	—
168,400	,,	,,	11	Do. B 7 p. c. . .	—	—	—
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p c.	135—140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd. . . .	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9
14,993,075	Stk.	Feb. 10	4⅝	Gas-light and Coke	4 p. c. Ord. . .	105—107	−3	4 11 7
2,600,000	,,	,,	3½		3½ p. c. max. . .	95—98	−3½	3 11 5
3,799,735	,,	,,	4		4 p. c. Con. Pref.	126—128	..	3 2 6
3,843,975	,,	June	3		3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental .	224—229	+1	4 7 4
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. Red,	102—105	..	3 6 8
75,000	5	June 15	6	Malta & Medn., Ltd. .	5—5½	..	5 9 1
560,000	100	Apl. 4	5	Met. of Melbourne	5 p. c. Deb.	112—114	..	4 7 9
250,000	100	,,	4½		4½ p. c. Deb.	110—112	..	4 0 4
541,920	20	May 31	5	Monte Video, Ltd. . .	13—14	..	7 2 11
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	June 29	8½	Do. 8½ p. c. Deb. .	106—109*	..	3 4 3
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd. . . .	7⅞—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6⅝—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1½	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd. . . .	5½—6	..	5 16 8
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds .	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord. . . .	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	101—103*	..	3 17 8
250,000	10	Mar. 29	10	San Paulo, Ltd. . . .	17—18	+½	5 11 1
135,000	Stk.	Mar. 29	10	Sheffield A.	244—249	..	4 0 4
209,053	,,	,,	10	Do. B.	244—249	..	4 0 4
447,427	,,	,,	10	Do. C.	244—249	..	4 0 4
5,600,000	Stk.	Feb. 10	5½	South Metrop., 4 p.c. Ord.	135—140	..	3 16 2
1,460,000	,,	Jan. 18	3	Do. 3 p. c. Deb. . .	101—103	..	2 18 3
120,000	Stk.	—	6	Tottenham and Edmonton	A. 5 p.c.	143—145	..	4 2 9
250,520	,,	—	4½		B. 2½ p.c.	103—105	..	4 5 9
55,100	,,	—	4		4 p.c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p.c. Deb. Red.	98—100*	+1½	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	315—320*	..	3 8 9
150,000	,,	,,	5	Do. 5 p. c. Pref. .	167—170*	..	2 18 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	148—153*	..	2 18 10
175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	155—160	..	2 16 3
1,720,560	Stk.	Apl. 18	7	East London, Ord. . .	220—224	..	3 2 6
654,740	,,	June 29	4½	Do. 4½ p. c. Deb. .	155—158*	..	2 17 0
390,000	,,	,,	3	Do. 3 p. c. Deb. .	101—103*	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p.c. max. .	111—114	..	3 5 9
810,000	Stk.	Mar. 29	4		4 p.c. Deb. .	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	360—365	..	3 16 9
160,000	,,	,,	7	Do. New, 7 p. c. max. .	210—215	..	3 5 1
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max. .	298—303*	..	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max. .	225—230*	..	3 9 7
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	135—140	..	2 17 2
500,000	100	Feb. 11	13½	New River, New Shares	430—435	..	3 3 3
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb. .	137—142	..	2 16 8
902,300	Stk.	June 15	7½	South-wark and	Ord. . . .	204—209	..	3 11 9
126,500	100	,,	7½		7½ p. c. max. .	193—198	..	3 15 9
489,200	Stk.	,,	5		5 p. c. Pref.	165—170	..	2 18 10
1,019,585	,,	Apl. 13	4	Vauxhall	4 p. c. A Deb.	135—140	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex . . .		300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb. .		154—158	..	2 17 0
200,000	,,	Mar. 10	3	Do. 3 p. c. Deb. .		102—104	..	2 17 8

£1307 5s. 2d.; sundry debtors, £8 6s. 8d.; balance of profit and loss account, £884 7s. 1d. This sum added to the interest produces £885 9s. 6d. The balance from the previous account was £565 16s. 5d.; charges are £262 3s. 10d.; advertising, &c., £2 2s. 4d.; and legal expenses come to £55 6s. 11d.—making a total of £885 9s. 6d. This, in the language of the auditor's certificate, "exhibits a true and correct view of the state of the Company's affairs." It will be interesting to see how the next profit and loss account stands.

ADDITIONAL WATER-WORKS FOR SOUTHBOROUGH.

A Local Government Board inquiry was recently held at the offices of the Southborough District Council by Mr. F. H. Tulloch, M.Inst.C.E., with respect to an application by the Council for power to borrow £4600 for expenditure on additional works of water supply. The subject has occupied the attention of the Council since August, 1895, in which year a contract was entered into with Messrs. Duke and Ockenden to sink a bore hole near the present receiving reservoir. Owing, however, to the tubes becoming jammed or wedged, and the Contractors being unable to withdraw them, it was decided to abandon the works; and the contract was terminated in September, 1896. A second contract was entered into shortly afterwards with Messrs. Isler and Co. for another borehole, which was on the same site as the first, and within 15 feet of it; and they proceeded, under the direction of Mr. Druitt Halpin, to a depth of 456 feet, when, after continuous pumping, it was found to be capable of yielding only from 1300 to 1500 gallons per hour. On the water being analyzed, it was ascertained to be not altogether satisfactory; and the yield being insufficient, it was decided to call in the services of Messrs. G. & F. W. Hodson, of Loughborough, to advise upon the general water supply of the district. The Local Government Board sanctioned a loan of £900 for five years for the second borehole; but as this period was so short, the District Council did not take up the loan. The contract for the second borehole was terminated, and the works stopped in the early part of last year, under the advice of Messrs. Hodson. These gentlemen reported at some length upon the water supply of the district, and advised the Council to abandon the site of both boreholes, and try to get water on land at Upper Haysden, in the Medway Valley, between Penshurst and Tonbridge. A third borehole having been sunk to a depth of 350 feet, almost entirely in the Ashdown sands, the water rose to and overflowed the surface; and upon analysis it was found to be of a very satisfactory character. The application to the Local Government Board to borrow £4600 was to cover the cost of the second and third boreholes (to include the £900 previously sanctioned), with an extension of time for repayment from five to thirty years, on the ground that if the experiment had been carried out by a public company the outlay would have been put down as capital expenditure. The cost of the second borehole and the trial boring at Haysden amounted to £1400; and £3000 is the estimated cost of sinking the proposed well, and driving the requisite headings, &c. The Inspector observed that it was clear the money had not been wasted upon the unsuccessful boring, as, if the experiment had not been tried, the Council could not have known that there was an absence of water. The Clerk to the District Council (Mr. Philip Hanmer) represented that body; and there was no opposition to the scheme.

SHEFFIELD CORPORATION WATER ACCOUNTS.

A Satisfactory Surplus.

The report and accounts of the Sheffield Corporation Water Department for the year ending March 25 last have been published. They show that there was a surplus on the year's working amounting to £14,005, against £13,843 on the previous year. This is the largest yearly surplus which has yet been shown since the water undertaking was acquired by the Corporation. The fact is the more remarkable, as the water charges during the year ended March 25 last (and for three months previously) were 12½ per cent. below what they had been since 1864; this reduction being one-half the amount of the 25 per cent. added to the water-rates by the Sheffield Water Act of 1864, which was one legacy of the great Sheffield flood. The precise state of affairs at the end of the year is exhibited in the report of the General Manager (Mr. William Terrey). The capital expenditure in connection with the existing works now amounts to £2,275,346; £16,391 having been spent during the past twelvemonth. On the Little Don works £199,734 was expended; but of this sum plant, machinery, and stores are accountable for £11,346. The total income from all sources during the year was £123,881, which is an increase of £2431 over the preceding year. The expenses of maintenance and management amounted to £24,085; so that the net revenue was £99,796. Annuities and interest on Corporation stock and mortgages absorbed £79,500. From the balance of £20,295, the annual instalment (£6290) for the redemption of annuities and the extinction of loan indebtedness has been deducted, which gives the surplus of £14,005. The accumulated surplus now amounts to £33,658. The number of houses supplied with water is 83,064; being an increase of 2545. There are 3380 water-meters in use, as against 3243 last year. The grand total of all supplies on March 25 was 114,889, against 108,487 in the previous year.

Salford Corporation Gas Supply.—The annual report of the Gas Committee was adopted at the meeting of the Salford Town Council last Wednesday. It stated that the business of the Gas Department continued to steadily increase. The additional consumption of gas in the year had been equal to 3·11 per cent. The coal and cannel carbonized amounted to 135,372 tons; and the quantity of gas made was 1,388,186,000 cubic feet, of an average illuminating power of 19·24 candles. The business in cookers and prepayment meters had greatly increased; and the revenue from the rental of cookers was nearly double that of the previous year.

JOSEPH AIRD
GREAT-BRIDGE.
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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Lighting Committee of the Corporation of Motherwell have had remitted to them to consider whether or not they should acquire the undertaking of the Motherwell Gas Company. This is the fourth time the subject has been before the Town Council; consequently it might be expected that, with the experience they have had, the members would be able to discuss it with intelligence. I do not find this to be the case, however. In fact, one of their own number called attention to the circumstance. The proposal was to consider whether they should take over the Company or erect gas-works for the burgh. Then the argument used in support of the proposal was that in towns where the gas undertaking is in the hands of the corporation the average price of gas is 2s. 6d. per 1000 cubic feet, whereas in Motherwell the Gas Company now charge 3s. 4d. The conclusion reached by the proposer was that "the exorbitant charges made, and the exorbitant profits taken, put it beyond doubt that the gas-works would be a good 'spec' for the ratepayers." It was pointed out, on the other side, that the profit of the Company last year was not sufficient to pay a dividend of 10 per cent., and that it was necessary to borrow from another fund; the opinion being hazarded that it would probably take from £80,000 to £90,000 to effect a transfer. I am doubtful as to the good "spec" for the ratepayers which the gas transfer would be. If I am not mistaken, a good deal requires to be done upon the gas-works, which would need capital outlay, as has been the case in more than one recent transfer, with the result that the price of gas would still remain high. I think it will be found that the places where the price of gas is low are those in which the transfers took place early. The advantage of municipal ownership of gas-works, I apprehend, is not works management, but finance management—the obtaining of money initially at a cheaper rate, and the operation of sinking funds, which are intended to extinguish capital. The promoters of the Motherwell transfer should, therefore, bear in mind that it would, in all probability, be many years before the community would benefit much by working the gas undertaking. On the other hand, it is fair to them to acknowledge that they have chosen a very favourable time for raising the question. In any arbitration it is almost a certainty that prospective outlays would be taken into account in fixing the price, to the effect of reducing it; and (a more important matter) there seems to be room for a very considerable expansion of the gas industry in Motherwell. These considerations lead me to regard it as probable that the movement this time will be carried through; and I consider that it is but just, both to the Company and the community, that it should be brought forward at such a time as this.

Dealing still with Motherwell, I notice that the annual meeting of the Gas Company was held on Thursday, two days after the Town Council had the subject of the transfer before them. The published reports of the meeting do not contain any reference to the proposed transfer; but this is only what was to be expected. The Directors reported that the affairs of the Company continue in a prosperous condition. The total income for the year was £10,093, and the expenditure £6781; leaving a gross profit of £3312. How much of the income was balance from the previous year, or derived from reserve or other fund, is not stated; but the remarks of the town councillor, referred to above, seem to indicate that part of the revenue was so derived. A dividend at the rate of 10 per cent. absorbed £3000. Of the balance, £312 was applied to depreciation, and £13 to meet bad debts.

The Ayr Gas Company held their annual meeting on Wednesday. The revenue account showed an income, including £280 brought forward, of £12,142. Of this, £10,330 was derived from the sale of gas, £348 from meter-rents, £392 from the sale of coke, and £702 from the sale of tar. The total expenditure was £8913; and there was thus a balance of gross profit of £3229. Coal, including cartage and fues, cost £5044, lime £263, wages £1193, and repairs, maintenance, and renewals £917. A dividend at the rate of 8 per cent. was paid. The Company are in a strong position, as they possess a reserve fund of £5300, and a suspense account of £162. The report of the Manager (Mr. W. Smith) stated that, on the completion of ordinary repairs, the works would be in good order. Notwithstanding the increase in the price of coal, gas is to continue to be sold at 3s. 4d. per 1000 cubic feet; the illuminating power being over 25 candles. The good management of Mr. Smith was recognized by an addition of £50 a year to his salary.

The annual meeting of the Hawick Gaslight Company was held yesterday—Mr. Thomas Laidlaw presiding. The Chairman, in moving the adoption of the Directors' report, said the electric lighting of the town was seriously considered some time ago by the Directors; but, after mature consideration, they came to the conclusion that it would not pay. If the manufacturers wished to adopt it, they could make it themselves; but they could not see how the quantity could be sold to remunerate for the outlay. Electric lighting was not extending so rapidly as was expected; and he believed that the incandescent gas-light would keep the lead, as it had done of late. The penny-in-the-slot gas-meter had been a great success generally; and in Hawick there were 300 such meters. Acetylene gas had been tried in several places; but as yet without much success. He had inspected an installation in the district; and while it was a brighter light, it was more costly, and had not been a success in the lighting of towns. Water gas was now rarely heard of, and oil gas was not progressing as expected. The profit for the year was £1868; and after paying a dividend of 10 per cent., there would be a balance of £293. The Directors also recommended that the price of gas be continued at 3s. 4d. per 1000 cubic feet. The Chairman concluded by paying a high compliment to their Manager (Mr. J. Smith) for the manner in which he had conducted the works. Mr. R. Noble, in seconding, said he had no doubt the day was not far distant when they would be able to use the incandescent light for their mills, which would make a saving probably of from 20 to 25 per cent., and give increased brilliancy over and above. The report was adopted. Hawick is one of the few places where the gas-works are almost wholly owned by the local manufacturers, which is probably the explanation of the intelligent statements that are always made by the Chairman of the Company.

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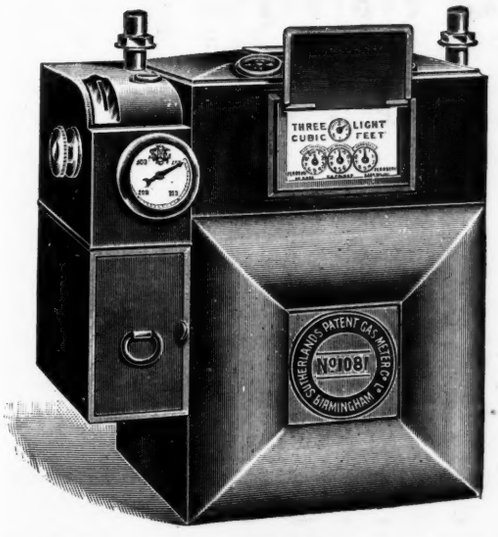

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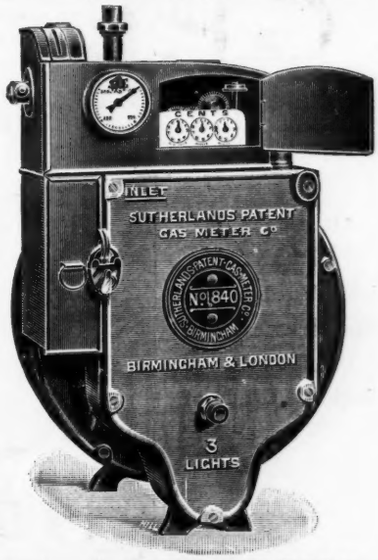

THE SUTHERLAND GAS-METER COMPANY,

ESSEX WORKS, BIRMINGHAM.

Another step in the solution of the great problem of who is to manage the Hamilton Corporation Gas-Works has been taken this week. In 1892, when Mr. W. Ewing was appointed Manager, it was stated that the works had been virtually managed for about seven years previous by the foreman or sub-manager; that the arrangement had been a good one; and that it was desirable to continue such a state of matters. It was accordingly resolved that the foreman should be appointed, or dismissed, by the Gas Committee. The arrangement has not worked well. Who could expect it to? There has frequently been friction on account of its existence. Latterly matters have come into a more acute state than formerly. A slight explosion occurred in the works recently. The Manager said that the foreman had omitted to do something which he told him to do. The foreman quite naturally took up an attitude of independence; and the Manager could not deal with him. The Committee spent three hours investigating the matter, and concluded that it had not been proved that the foreman had been guilty of gross negligence. They, however, recommended that the resolution adopted in 1892 should be rescinded, and that the Manager should have full control of the men at the gas works, and should appoint the foreman. Mr. Tainsh, who was Convener of the Gas Committee before 1892, and who has not, from the commencement, supported the management of Mr. Ewing, objected to the proposal to rescind. His speech in support of his position was a fearful illustration of what a man may fall to when once he admits false reasoning. Mr. Tainsh was Convener at the time when the foreman was virtually manager. He also approved of the arrangement which was made when Mr. Ewing was appointed; and he is of the same opinion still. He started with the notion, derived from experience, that what was found to be good in the days of Mr. Ewing's predecessor, must be good in these days too. But, the premises being different, the conclusion should also be different. If the former Manager allowed the foreman to virtually control the gas-works, he must not have been able himself to pay constant attention to his duties. But Mr. Ewing is not in this position. What Mr. Tainsh said was that "he thought it unsafe to leave the works in the hands of one man to do what he liked. They had already suffered from the want of a competent foreman; and they knew what happened when another foreman reported that material was coming into the works not according to specification, and what it was bought and sold for. . . Why should they take a step which would enable the Manager to be dominant? They should have a foreman who would check the Manager, and who would not be under his control." This is nonsense, on the face of it, apart from the facts. The works are not to be in the hands of one man, to do with as he likes; the Committee and the Town Council are there to see that the Manager does his duty. Any check must come from an independent source; otherwise it would not be effective. Imagine the cashier's first clerk being appointed to audit the books of the undertaking. Then, if the undertaking had suffered already from the want of a competent foreman, that is a confession that the old arrangement is not a success; and when that is reached, the conclusion is that the appointment of the foreman should be left in the hands of the Manager, who will know the man who will best fill the post, or, if he should happen to give it to one who turned out unsuitable, could make the necessary change without more ado. What Mr. Tainsh's approved method of working amounts to is not check but espionage. Many managers know that there is sufficient of that abroad, in all conscience, and that it is bad enough as it is; but how intolerable would it be were an official spy to be appointed, to stand over the manager. The wonder is that the arrangement has been put up with in Hamilton so long. I suspect it has only been so on account of the prevalence of sweet reasonableness; and it might have still continued if the subject had not been precipitated by events. It has gone now, however, for the Town Council, by 10 votes to 2, rescinded the resolution of 1892. This result followed a most moderate speech by Bailie M'Hale, the present Convener of the Gas Committee, who pointed out, with much force, that the arrangements in Mr. Tainsh's day, when the output of gas was from 20 to 25 million cubic feet a year, would not be suitable now, when the figure is close upon 120 million cubic feet. The man who will be appointed, he also said, is to be one capable of taking charge of the works during Mr. Ewing's absence, through sickness or otherwise, which none of the present men was qualified to do.

Two actions have been raised in the Court of Session, at the instance of mechanics belonging to Lochgelly, in Fifeshire, against the keeper of a temperance hotel in Glasgow, in which damages, to the amount of £250 each, are sought in respect of the pursuers having suffered from gas poisoning. The two men occupied one bed on the night of Saturday, April 1, and were found on the following day in bed in an unconscious state. The averment is that the gas-fittings in the bedroom were in a defective state; but this is denied. This is matter of proof, and is of little consequence. The important part of the case for readers of the "Journal" is that in which the pursuers allege that they still suffer from general weakness and giddiness, and have sustained a severe shock to their systems. The shock I can understand; and the hotel keeper would be well advised if she offers a sum, which need not be large, upon this head. But as to weakness and giddiness continuing, if that should go to trial it will have to be threshed out by scientific evidence, and the result will be interesting. There is another element in the case of minor importance. The defender avers that the escape of gas was due to the failure of the pursuers to turn off the gas properly; and she complains that her business has suffered by the pursuers circulating the story they are doing. For her loss, she reserves her claim against them.

The Crieff Gaslight Company have paid a dividend at the rate of 5 per cent., and a bonus of 1s. per share, which makes the dividend equal to 10 per cent. On account of the rise in coal, the price of gas has been advanced from 3s. 9d. to 4s. 2d. per 1000 cubic feet. The Pittenweem Gas Company have paid a dividend of 10 per cent., and have continued the price of gas at 4s. 2d. per 1000 cubic feet. The Alyth Gaslight Company have paid a dividend at the rate of 5 per cent., and have voted Mr. A. Robertson, their Manager, an honorarium of five guineas for his diligence in the interests of the Company.

The annual general meeting of the shareholders of the Brechin Gaslight Company was held in the Masonic Hall on Monday—Mr. James Guthrie, J.P., in the chair. The reports and balance-sheet for the year were submitted and approved of. It was agreed to declare a dividend of £1 7s. 6d. per share, the same as last year. It was also agreed to increase the price

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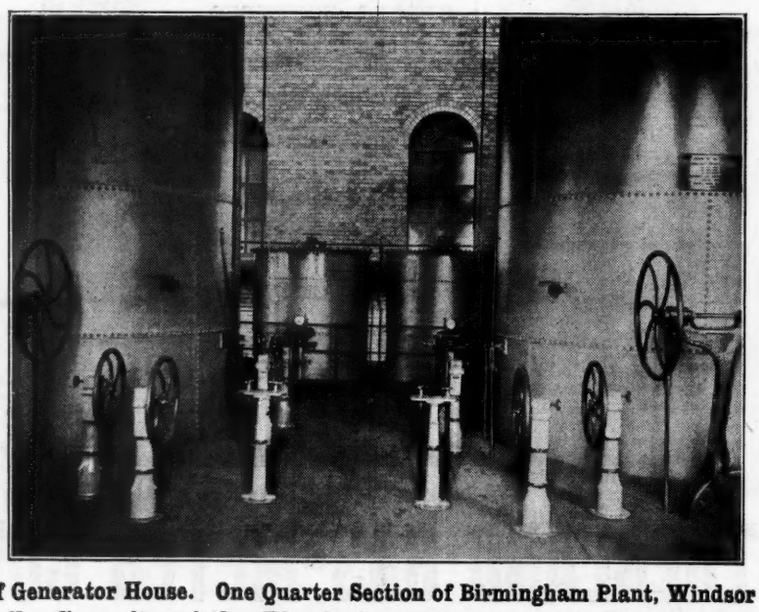

RESULTS PROVE EFFICIENCY.

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of gas 1d.—making the charge 4s. 6d. per 1000 cubic feet. Messrs. James Guthrie and William Johnston were re-elected Directors, and Mr. H. Braid was appointed a Director in room of the late Mr. Simpson. The only other matter of note brought before the meeting was the realization of the large holding of shares so long possessed by the Montrose Lunatic Asylum. The money was required for new buildings, and the increased demand for gas cooking-stoves and penny-in-the-slot meters.

The Aberdeen Town Council on Monday considered a proposal of the Gas Committee to charter the steamer *Kenilworth* to carry coal for the gas-works. The terms are that the vessel is to be in the employ of the Corporation for eight months from Aug. 1, at £225 per month. Mr. Johnston, the Convener of the Committee, said that last year their coal was carried at the rate of 2s. 9d. per ton, but that this year the lowest tender they received was 3s. 3d. per ton. They found that, by chartering a vessel, they could carry the coal themselves for a fraction over 2s. 11d. per ton. Mr. Meff thought that the old method would be found the more economical. It was apparently, he said, arranged that the vessel should make ten voyages per month; but he doubted whether this could be done. He proposed that the matter should be sent back to the Committee for fuller consideration. No one supported Mr. Meff, and the Committee's proposal was thus adopted.

Sheriff Lees, of Stirling and Dumbarton Shires, heard agents in the Court House at Dumbarton, on Monday, in a petition by the Commissioners of Helensburgh, for an order authorizing them, without the consent of adjoining proprietors or residenters, to erect a gasholder or gas manufacturing plant at South King Street. Mr. Ormonde, who represented 25 proprietors and over 30 tenants within the radius given by the Act, submitted that the present gas-works and ground were perfectly sufficient for the next twenty years, and that there was no necessity for erecting storage accommodation or transferring the works to the proposed new site. It was only in May last that the petitioners acquired the gas-works. Subsequent thereto the Commissioners appointed a Gas Committee; but there was no unanimity among them with regard to the proposed extension and transfer of the works. Six of the Commissioners were favourable and six adverse; and the proposal to remove was carried by the casting vote of the Chairman. His clients were likely to be affected by the transfer, for they held their feus on the condition that they were to build villa residences; and it was not fair to them to have the gas-works planted down in their midst. If necessary, the Commissioners should erect them outside the town. Mr. Ness, in reply, said the Commissioners had no desire to act prejudicially to any ratepayer or body of ratepayers. They were not making this application hurriedly, but because they were forced to look forward to the increasing consumption. Their Consulting Engineer had advised them that the storage accommodation was quite inadequate. It was generally recognized that a gas-works should have storage accommodation for at least one day's consumption; and they had less than a third of this. Then they were forced to consider the matter from an economical point. There was no room for extensions within their present works. He was in a position to rebut all the arguments adduced by the objectors; and he submitted that the villa residenters would not be affected, and neither would the market gardeners. At present, the Commissioners only contemplated the storage of gas; but if they acquired the ground, they wished power to go in for manufacture as well. It was arranged that evidence will be led on an early date, if the Sheriff requires it.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 8.

Sulphate of Ammonia.—There has been more buying going on for immediate delivery. But a greater portion of the larger make has been available than was the case in June; and prices have again declined. The closing quotations are £12 3s. 9d. to £12 5s. per ton, delivered f.o.b. at the ports. The output by the smaller makers has also been available; but this is just now a very limited quantity. In the forward position, sellers do not seem inclined to accept less for July-August delivery than for prompt; and buyers are in no hurry to operate. Further ahead—October-December—there are sellers at £12 per ton.

Nitrate of Soda is, owing to further arrivals, weak on spot; the closing quotations being 7s. 7½d. per cwt. for fine quality.

LONDON, *July* 8.

Tar Products.—There is a rather better feeling with regard to benzol; and notwithstanding that little actual business seems passing, slightly higher prices are being asked for benzols, toluol, and solvent. Pitch is also quoted higher, though this seems more or less nominal, and represents quotations rather than actual business. Creosote, carbolic acid, and other products remain stationary. Average prices may be taken as follows: Tar, 15s. 6d. to 24s. Pitch, east coast, 28s. 6d.; west coast, 25s. 6d. Benzol, 90's, 7d.; 50's, 8d. Toluol, 1s. 1½d. Solvent naphtha, 1s. 1½d. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3½d. Creosote, 3¼d. Heavy oils, 62s. 6d. Carbolic acid, 60's, 2s. 1d.; 75's, 2s. 8d. Creosote salts, 47s. 6d. Anthracene, "A," 3½d. to 4d.; "B," 2½d. to 3d.

Sulphate of Ammonia has weakened since the last report, and the price ranges from £12 to £12 5s., less 3½ per cent., although buyers do not seem keen to purchase.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The general slackening off in demand for house-fire requirements, which is making itself still more felt owing to the very large adoption of gas cooking and heating appliances, is to some extent weakening the position as regards the better qualities of round coal, which are now accumulating in stock, with many collieries not running more than four days per week. So far as Lancashire collieries are concerned, there is no actual giving way on list rates; but where in some cases what may be termed special prices were being quoted, these are not now being held for, while coal is coming in from

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Yorkshire and other districts, at low figures, which is successfully competing against local coals of similar quality. At the pit, prices range from 11s. 6d. to 12s. 6d. per ton for the best Wigan Arley, 10s. to 11s. for Pemberton four-feet and seconds Arley, and 9s. to 9s. 6d. for common house coal. Merchants are still holding out against settling contracts with the new clause for regulating prices according to current market rates when deliveries are made; and the Liverpool Merchants' Association are endeavouring to arrange a meeting with the Lancashire Coalowners' Association to discuss the situation. It is, however, very doubtful whether the collieries will be prepared to concede any material modification of the present contract clauses. Supplies of lower-class round coals are rather more plentiful, with a slight easing down on the maximum figures. Good ordinary qualities of steam coal do not now average more than 8s. 9d. to 9s. per ton at the pit. Shipping is only moderate; and there is some irregularity in prices. Ordinary steam coal averages about 9s. 6d. per ton delivered at the Garston Docks, and 10s. at the High Level, Liverpool. For engine fuel there is a continued brisk demand, with the better qualities not at all plentiful on the market; but the attempt which some collieries made to advance prices last week has been practically abandoned, and the average quotations remain at 6s. 6d. to 6s. 9d. per ton at the pit for best slack, 5s. 6d. to 5s. 9d. for medium, and 4s. 9d. to 5s. for common sorts.

Northern Coal Trade.—There is a steady demand in the coal trade of the North-east; and the collieries are generally working fully, though with the usual interruption at this time of the year through the mining and general holidays. In gas coals, there is at present a little irregularity. The consumption is now very low; and thus the quantities sent out are moderate, though fuller shipments are being made. Some of the best of the Durham gas coal collieries are so fully contracted that, for the little free coal they have, they ask 10s. per ton f.o.b.; while the general price is from this down to about 9s. 6d. per ton. An increased demand for gas coals may now be anticipated, however, as stocks have been brought down. The price of gas coke is unaltered this week.

Scotch Coal Trade.—There is a satisfactory demand for all classes of coal, particularly for steam raising and other industrial purposes. Another conference between masters and men has been held in Glasgow, to endeavour to come to a working arrangement. The two parties differed as to terms; and the masters' proposals have been again referred to the miners. Current prices are: Main 8s. 9d. to 9s. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s. 3d., and splint 9s. 9d. to 10s. The shipments for the week amounted to 226,136 tons—an increase of 10,490 tons upon the previous week, but a decrease of 29,100 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,204,245 tons—a decrease of 357,686 tons on the same period last year.

Water-Works for North Walsham.—The North Walsham District Council last Thursday received tenders for the construction of water-works, &c., from Messrs. Tilley and Sons and Messrs. Holmes and Sons. It was decided to accept the tender of the latter firm for carrying out the work for £7000, subject to the sanction of the Local Government Board to the borrowing of £8000 for a period extending over at least forty years.

Expulsion of the Standard Oil Company from Ohio.—The New York Correspondent of the "Yorkshire Post" says the Standard Oil Company have been expelled from business in the State of Ohio, in consequence of a successful prosecution under the Anti-Trust Law. The Company's plant in Cleveland, which is the second largest in the world, is now stated to be practically abandoned.

Advance in the Price of Gas Coal.—The Gas Committee of the West Bromwich Corporation have accepted tenders for the supply of coal for the ensuing twelve months, at an average increase of 2s. per ton. The Bolton Corporation Gas Committee have also completed their coal contracts at an advance of 1s. 6d. per ton, which Mr. Alderman Miles, the Chairman of the Committee, told the Council last Wednesday was less than was generally anticipated.

The Manufacture of Residual Products by the Manchester Corporation.—The Gas Committee of the Manchester Corporation have given further consideration to their proposal to undertake the manufacture of residual products of the gas-works, and on Friday resolved that it would be to the interest of the department and for the benefit of the citizens that the City Council should proceed with their application for power to borrow the money required for the purpose.

The Local Government Board and the Water Scheme for West Bridgford.—The application of the West Bridgford District Council for the consent of the Local Government Board to the purchase of the portion of the water undertaking of the Nottingham Corporation within West Bridgford, and for sanction to borrow £20,000 to defray the cost of the purchase and for purposes of water supply, has received the careful consideration of the Board; and, having regard to the circumstances of the case, they have decided not to comply with the application.

The Question of Discounts in Belfast.—At the meeting of the Belfast County Council last Wednesday, Mr. Stewart, in seconding the motion for the adoption of the Gas Committee's minutes, said the Committee had taken Counsel's opinion on the question of discounts, and they were advised that they could not allow an all-round discount on gas accounts. The Committee very much regretted this, and hoped that at some future time they would be able to grant the discount. Mr. Bowman asked if they could not instruct the Committee to state their case to Counsel differently. Probably it was not possible to allow discount all round, but he believed there was no law to prevent them giving 20 per cent. reduction to small consumers, even though it was necessary, in order to do so, to increase the price of gas nominally by 3d. per 1000 cubic feet. Alderman Dempsey said he should like to have the case submitted to Counsel read, and also the answer. He was dissatisfied with the opinion given, which, he believed, was different from that expressed on the question by certain eminent Counsel. The profits of the gas undertaking were large enough to warrant the Council in allowing a discount all round, or in reducing the price of gas, which was higher than it should be. It was doubtless greatly to the credit of the city of Belfast to have made so much money for another generation; but he thought each generation should look after itself. Mr. Bowman moved an amendment referring the question back to the Committee; and it was carried.

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NEW SEASON'S LIST NOW READY.

The Boston Corporation and the Gas and Water Works.—The Finance Committee of the Boston (Lincolnshire) Corporation have been instructed to investigate the question of purchasing the local gas and water undertakings.

Increase of Wages in the Bolton Gas Department.—The Gas Committee of the Bolton Corporation have increased the lamplighters wages 2s. per week, and raised the scale of the meter inspectors' wages from 30s. to 32s. weekly.

The Broadstairs District Council and the Water-Works.—At the last meeting of the Broadstairs District Council, a resolution was passed expressing the opinion that the time has arrived when the water supply should be in the hands of the Council; and a special meeting is to be held to consider the best means of bringing about this result.

A Water Supply for Wallasey from Liverpool.—The Water Committee of the Wallasey District Council, after considering the question of obtaining a supply from the Liverpool Corporation, and having had an interview with the Water Sub-Committee of the Corporation, have resolved to have a 10-inch main laid, or larger if the Liverpool Corporation desire, to be vested in the Wallasey Council, and that they should pay to Liverpool, until the loan was repaid, 6½ per cent. for interest and maintenance on the cost of the work, and 1 per cent. for maintenance when the loan was repaid, and that water should be supplied at the rate of 6d. per 1000 gallons. The Liverpool Engineer has estimated roughly that the cost of the works would be £90,000.

Gas-Main Extensions at St. Helens.—At the last meeting of the St. Helens Corporation Gas Committee, reference was made to the minutes passed at the meeting of the Committee on June 8, 1898, with respect to the proposed loan of £25,000 for the extension of the gas-works, gas-mains, and other purposes, and in which it was stated that the Local Government Board would sanction the borrowing of the sum of £3500 for distributing mains and services when it was required. It was now reported that during the year ended March 31 last £1200 had been expended on mains; and during the ensuing year and the year following, it was estimated that a further sum of £2000 would be required. It was resolved that the Town Clerk be instructed to apply to the Local Government Board for their sanction to the borrowing of the £3500.

The Damage Caused by the Recent Explosion at St. Helens.—At the meeting of the St. Helens Town Council last Wednesday, Mr. Leach asked the Chairman of the Parliamentary Committee what the situation was in reference to the decision to take Counsel's opinion as to who was responsible for the damage caused by the recent lamentable explosion. There was considerable anxiety in the town to know what was being done in the matter by the Corporation; and it was generally felt that there had been plenty of time in which to obtain Counsel's opinion. Alderman Forster replied that, at the last meeting of the Committee, the Town Clerk stated that he was waiting for the Home Office report to be presented, in order to assist him in drawing up his case properly. The Committee thought this would be the best course to pursue, so that they were waiting.

Larne Town Commissioners and the Purchase of the Gas-Works.—The Larne Town Commissioners seem to have got themselves into a bit of a muddle over the proposed purchase of the gas-works. At their meeting last Tuesday, a letter, in very definite terms, was received from the Gas Company's Solicitors (Messrs. Carson and M'Dowell) with regard to the subject. They wrote: "It is clear that it is not the intention of the Commissioners to obtain the sanction of the Local Government Board, as they undertook, and as it was their intention to do. On behalf of the Gas Company, we desire now to say that they withdraw, as they are entitled in the circumstances to do, their acceptance of the Commissioners' offer to purchase, and declare the negotiations at an end. At the same time the Company reserve their right to proceed against the Commissioners, both in their corporate capacity and as individuals, to recover damages for their wanton and faithless conduct." The Clerk also presented a writ which had been served on behalf of Mr. Andrew Gillespie, of Glasgow, for £74 for work and labour done in reporting upon and valuing the gas-works and preparing plans required in connection with the application for their Provisional Order. After considerable discussion, it was resolved to tender £50 to Mr. Gillespie in full settlement of his account for services in connection with the gas undertaking.

East Surrey Water Company.—The annual general meeting of this Company was recently held at the offices, Redhill—Sir F. Bramwell, Bart., in the chair. The Directors reported that 822 consumers had been added during the year ending the 25th of March; and the mains had been extended by 22 miles—not one of the 26 parishes within the Company's area being without a supply therefrom. The profit for the year had been £16,817, which, added to the balance of £1466 brought forward, made a total of £18,283, out of which the Directors had placed £1500 to the renewal and contingency fund. They recommended that a dividend of 5 per cent. upon the preference, and one of 7 per cent. upon the ordinary shares (less income-tax in both cases) should be declared for the year. An interim dividend, however, of 2½ per cent. on the preference and of 3 per cent. upon the ordinary shares, disposing of £4659, having been paid on the 7th of December last, there would remain 2½ per cent. to be paid upon the preference and 4 per cent. upon the ordinary shares; leaving a balance of £1354 to be carried forward. The Chairman, in moving the adoption of the report and accounts, said the Company were for the first time in their history paying the full dividend upon the 7 per cent. shares, and were doing so without trenching upon the income. The prospects of the undertaking were good; as the business was increasing over the whole of the area. The Directors were providing for its further extension by arranging to raise more capital. The report was adopted, and the dividends recommended were declared. At the close of the ordinary business, a special meeting was held at which the Directors were authorized to issue by tender 2000 additional £10 shares and create more 4 per cent. debenture stock. The proceedings closed with votes of thanks to the Company's Engineer, Manager, and Secretary (Mr. J. R. Downes), with whom is associated, as Assistant, Mr. Archibald E. Walker; and also to Sir Frederick Bramwell for presiding.

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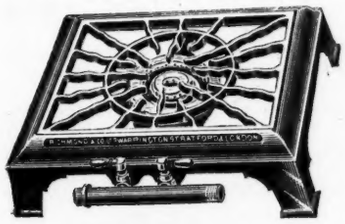

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Sandiacre Gas-Works.—The Sandiacre Parish Council are deliberating as to the advisability of purchasing the gas-works. They have been offered to them by the Managing Director (Mr. Hooley); and it is considered the transaction would be an advantageous one both to the consumers and the ratepayers. That, of course, will depend on the price.

The Dublin Corporation Lighting Departments.—The Dublin Corporation have instructed the Electric Lighting and Special Gas Committees to prepare a report with reference to providing a separate staff for these Committees, which staff should include a Secretary, one of whose qualifications shall be technical knowledge of the working of gas and electricity.

A Water Scheme for Brynmawr.—At a meeting of the Brynmawr District Council last Wednesday, it was resolved to repeat an application to the Local Government for sanction to borrow £6000 for improving the water supply by enlarging the reservoir, erecting an additional storage tank and filter-bed, substituting larger mains, services, &c. The scheme will increase the storage capacity from 8½ to 22 million gallons.

Fire at the Guildford Gas-Works.—Some excitement was caused at Guildford last Sunday night by a fire at the gas-works. The flames originated in the governor-house; and there was a big flare through the gas from the governor becoming ignited. When the firemen had succeeded in partially subduing the flames, they loaded the governor with heavy iron. As a result, a portion of the town was placed in darkness. No personal injury, so far as can be learnt, was sustained, though the residents in the neighbourhood were greatly alarmed.

The West Riding County Council and the Mentons Water Bill.—There seems to have been a good deal of grumbling lately against the West Riding County Council on account of the persistent antagonistic policy which they have adopted in connection with matters which have their origin outside their own body. The Menston Parish Council have a strong case against them. When the village had to go in search of a water supply, the County Council, as usual, objected. Menston, naturally anxious, in its smallness, to avoid unnecessary legal expenses, endeavoured to negotiate an amicable arrangement with its powerful opponent; but fruitlessly. The County Council, at a cost which is put at £5000 or £6000, fought the Menston Bill, with the result only of getting worse terms, from the county point of view, than Menston had offered for a peaceful agreement.

Profit Earning on Municipal Water Undertakings.—Alderman Godkin is the Auditor to the Mayor of Loughborough; and, in his half-yearly report, he has been relieving himself of his views on the question of the Municipal water undertaking being a profit-bearing concern. He says: "The water undertaking is not yet so profitable as some of the other Municipal property; but in the next generation it ought to develop into a handsome annual return, equal at least to a general district rate of one shilling in the pound. The total capital borrowed for water purposes is £64,000; and the revenue from sales of water is £3770. By deducting £860 for maintenance and working expenses, a surplus of £2910 remains, which would be a net return of over 4½ per cent. The interest and working expenses have for some time been met out of the water charges and a great proportion of sinking fund. It is now time some profit revenue was made out of so large an employment of capital. The sinking funds, in my opinion, should, not unfairly, be chargeable on the rates, as it is only the purchasing of valuable property by a succession of ratepayers to the advantage of generations after us, who would have an unburdened revenue, whereas profit revenue from charges could be utilized for desirable improvements, without directly increasing the general district rate."

A Costly Water Scheme for a Rural District.—At Ripponden last Tuesday, Mr. H. Tulloch conducted a Local Government Board inquiry as to an application by the Soyland District Council for sanction to borrow £12,000 for the provision of an efficient system of water supply. The population of the district, it was stated, was 3300, and the rateable value £13,707. The existing water supply, besides being inadequate, was unsatisfactory as regarded quality. A farm, on the Rochdale road, had been purchased as a site for a reservoir. This was to be constructed to hold 5¼ million gallons of water, which was equal to 90 days' supply, at the rate of 20 gallons per day per head of the population. The flow into the reservoir, even in the driest weather, was estimated at 43,000 gallons per day; and the daily average for the whole year was put at 100,000 gallons. An analysis which had been made of the water showed that it was of excellent quality. Why the scheme was so costly was that, owing to the distance between the populous parts of the district, seven miles of piping would have to be laid for the distribution of the water at a cost of above £540 per mile. The scheme was opposed by owners of farms and mills on the ground that the construction of the works would interfere with the water supply to these properties, and no provision for compensation had been made. The Inspector at the close of the inquiry viewed the district.

Wolverhampton Corporation Water Undertaking.—The annual report of the Wolverhampton Corporation Water Committee reveals a very satisfactory position of affairs. The total expenditure during the year was £22,244; and a profit of £6632 has been realized. This is the largest sum ever returned as a year's profit since 1868; and it is proposed that £4000 be handed over to the improvement fund. The income was greater than in any previous year; and the expenditure was lower than in any year since 1889, with the exception of 1897, when it was about £50 less. Additions and renewals at the works are proposed at a cost of about £2250.

Bursting of the Thirlmere Water-Main.—The bursting of the great pipe-line which conveys the waters of Thirlmere to Manchester is reported as having occurred on Stanley Grange Farm, Hoghton, near Blackburn. The accident, which happened on the afternoon of the 2nd inst., was marked by a loud report; earth and rock being hurled high into the air, followed by a huge column of water, which surged out of the deep chasm created by the bursting of the pipe, and swept with devastating force over the adjoining fields. News of the disaster was telephoned to Manchester, and men were at once despatched to stop the flood. A similar disaster recently occurred on the same land.

Reduction of Discounts at Darlington.—At the meeting of the Darlington Town Council last Thursday, the Gas Committee recommended that on and after the 21st of September next 3d. per 1000 cubic feet be allowed as discount off all accounts for gas, instead of 6d. as heretofore, when such accounts are paid within fourteen days of delivery. Alderman Barron, the Chairman of the Committee, moved the adoption of the recommendation. In doing so, he said the Committee were very sorry to ask the Council to pass a minute which would have the effect of raising the price of gas for a time; but they were forced to do it from the fact that the coal they had purchased was seriously increased in price. The Committee very properly decided that the Council should be asked to confirm the recommendation that a substantial part of the increase should be borne by the gas consumers, which would still leave some for the ratepayers generally to bear. The recommendation was agreed to.

The Quality of the Worcester Water Supply.—The City Engineer of Worcester (Mr. T. Caink) has prepared, in the form of a report, a review of the city water supply during the five years ended on the 25th of March last. He alludes to the measures taken to increase and improve the supply from the works at Brabourne, and proceeds to describe its quality. He says: "No doubt since the early part of 1894, after the new filters were fairly matured, the City Analyst's reports have been generally more favourable. But frequently the chemical analyses have shown no better, and at times not such good water, from a chemist's point of view, as had often been obtained before the extensions of the filter-beds were made; while the results of the analyses undertaken by the Clinical Research Association showed a water much inferior to that often found prior to 1894. How far the chemical purity of a water is any index of its hygienic purity is a point upon which authorities are not entirely agreed." As there were no bacteriological examinations periodically made prior to 1894, such comparisons with the present supply cannot be made. Mr. Caink therefore falls upon the statistics of the Medical Officer of Health, supplemented by a chart. The improvement in the water supply has been maintained until in the last quarter of 1898, for the first time on record, not a single case of typhoid was contracted in the city. The chart gives comparisons with the towns having various sources of water supply—Birkenhead, Wolverhampton, Southampton, Liverpool, Manchester, Plymouth, Reading, and London. The typhoid rate per 100,000 per annum has decreased in Worcester from 155 to 145, 110, 36, 43, 45, and 31 in the years 1892-8; the average of 219 other towns being 88, 142, 103, 115, 102, 100, and 115, for the respective years referred to.

Among exhibitions of gas appliances last week, Messrs. John Wright and Co. were showing at Seaforth, with lectures by Miss Ada Ball.

The Oakengates and St. Georges Gas and Water Company, Limited, have placed with Messrs. R. Dempster and Sons, Limited, of Elland, an order for two of their improved shallow regenerator retort-settings.

Messrs. Joseph Taylor and Co., of Bolton, have in hand orders for plate-lead saturators of their latest construction for the Hull station of the British Gaslight Company, Limited, and also for the Sunderland and Hexham Gas Companies; the combined weight of the three being upwards of 20 tons.

The Warrington employees of Messrs. Richmond and Co., Limited, had their annual excursion to Blackpool on the 1st inst. The party, to the number of about 600, were first entertained to breakfast; and the managers, foremen, and heads of departments dined at noon at the Palatine Hotel. The firm have been awarded first and second certificates and a gold medal for gas-cookers at the Auckland (N.Z.) Exhibition.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

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WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

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"Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham; and 45 & 47, Westminster Bridge Road, London, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

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SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. Melrose Cycle Company, Coventry.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
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JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, St. Andrew Square, Edinburgh, Newton Grange, Newcastle, Dalkeith, Scotland.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see July 4, p. 74.]

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HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
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For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
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INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
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Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

BENZOL, specially made for the Enrichment of Gas.
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IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
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BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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WANTED, by a thoroughly practical Man, a berth as MANAGER of small, or ASSISTANT of medium-sized, Works. Age 33. Fourteen Years' Experience. Excellent Testimonials.
Address No. 3302, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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WANTED, one or two Gentlemen to join Advertiser in BRINGING OUT a NOVEL AND USEFUL PATENT. Gentlemen having a thorough knowledge of Distribution preferred.
Address No. 3300, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man, a Situation on Gas-Works as ASSISTANT. Five Years with well-known Gas Engineers. Understands testing for Illuminating Power and Impurities, and general routine of Gas-Works.
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WANTED, a Gas-Fitter well up in Compo. and Iron.
Apply, by letter, stating Experience, with References, to No. 3306, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TEWKESBURY GAS COMPANY, LIMITED.
WANTED, a Fitter able to do all branches at Small Works and for Private Customers.
Apply, stating Age, Experience, and Wages, to RALPH CHANDLER, Secretary.

WANTED, a thoroughly experienced Man to look after Engines, Exhausters, and Pressure Registers.
Apply by letter, stating Age, Experience, and Wages required, with References, to No. 3295, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ASSISTANT CLERK.
WANTED, immediately, an experienced Young Man as ASSISTANT CLERK. Used to the general routine of a Gas Office. Age about 25 Years.
Apply, by letter, giving all Information, to No. 3303, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at a Provincial Gas-Works carbonizing about 27,000 Tons per annum, a RETORT-HOUSE FOREMAN. Must be thoroughly acquainted with the working of Regenerative Furnaces and the modern methods of Carbonizing. Age not over 40. Wages £2 2s. per week.
Apply, by letter, to No. 3304, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-WORKS FOREMAN.
WANTED, for a Gas-Works in Scotland, manufacturing over 100 millions per annum, a WORKS FOREMAN. Applicants must be good Mechanics, have a thorough knowledge of Regenerative Furnaces, and accustomed to control Men. Wages from 40s. weekly, according to experience.
Apply, immediately, by letter, enclosing three recent Testimonials, to No. 3299, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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MANAGER AND SECRETARY.
THE above Company are open to receive APPLICATIONS for the above position. Salary £120 per annum, with House, &c., free.
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Apply, stating Age, Maker, and Price, to No. 3305, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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Two PURIFIERS, 5 ft. square by 4 ft. deep.
One " 5 ft. " 3 ft. "
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Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS GASHOLDERS and TANKS, VALVES, &c., &c.
Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE, cheap to clear—
TOWER SCRUBBER, Walker's, 5 ft. by 40 ft.
STATION METER, 8-inch, complete and perfect.
EXHAUSTER and ENGINE, combined, Waller's, 9-inch Valves, Governors, &c., complete.
GASHOLDER, 35 ft. by 14 ft. deep. Only six years old.
If sold this month will accept any reasonable offer.
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GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TAR.

THE Directors of the Ormskirk Gaslight Company are prepared to receive TENDERS for their surplus TAR for Two Years, from Sept. 1, 1899, to Sept. 1, 1901, free on Rails at the Ormskirk Railway Station at a price per ton of 2240 lbs.
Tenders to be addressed to the Chairman of the Gas Company, Gas Company's Offices, Aughton Street, Ormskirk, and to be sent in on or before Saturday, July 22, 1899.

JOHN MARTIN.

Ormskirk, July 8, 1899.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of LIME, TUBES and FITTINGS, and SULPHURIC ACID, and also for the purchase of surplus TAR.
Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.
Contractors tendering for this work must pay their Workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.
Sealed and endorsed Tenders to be sent to me not later than Tuesday, July 18, 1899.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
June 21, 1899.

THE GASLIGHT AND COKE COMPANY.

TENDERS FOR COKE.

THE Directors of this Company are pre- pared to receive TENDERS for the purchase of COKE to be supplied into Barges or Railway Trucks at their Beckton, Nine Elms, and Fulham Stations within the Twelve Months ending the 30th of September, 1900.
Particulars and Forms of Tender can be obtained upon application at this Office.
Tenders to sent in at or before Noon on Wednesday, the 26th inst., addressed to me, and endorsed "Tender for Coke."
The Directors do not bind themselves to accept the highest or any Tender.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 7, 1899.

CORPORATION OF LANCASTER.
(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee are prepared to receive TENDERS for the supply of screened GAS COAL and CANNEL delivered on the Gas-Works Siding, Lancaster, in such quantities and at such times as may be required during a period of One Year, commencing delivery Sept. 1 next.
Sealed Tenders, endorsed "Gas Coal," giving full Particulars of the Coal and Cannel offered, must be delivered to T. Conn Hughes, Esq., Town Clerk, Lancaster, on or before July 15 next.
Any further Information and Forms of Tender may be obtained on application to the undersigned.

C. ARMITAGE.

Gas-Works, Lancaster,
June 29, 1899.

URBAN DISTRICT COUNCIL BOROUGH OF NEWRY

TENDERS FOR COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of from 3000 to 3500 Tons of best GAS COAL (Screened) for a period of Twelve Months, to be delivered at such times, and in such quantities, as may be required by the Committee, and to weigh 20 cwt. to the ton over the Gas Committee's Weighing-Machine at their Works (said Machine regularly inspected by Officer under Weights and Measures Act), and delivered *free ex* Ship or Steamer at Albert Basin, Newry.
The Coal to be fresh Wrought, Dry, and free from Clench, Pyrites, or other Objectionable Matter for Gas Making.
Further Particulars may be obtained from Mr. A. Gibb, Manager.
Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, and where raised, to be addressed to John Trenor, Esq., Chairman, and delivered to the undersigned not later than Eleven a.m., on Friday, the 14th of July next.
The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
R. H. DOHERTY,
Town Clerk.

New Town Hall, Newry,
June 30, 1899.

WORTHING GASLIGHT AND COKE COMPANY.

THE Company are prepared to receive TENDERS for 800 ORDINARY SHARES of £10 each, ranking for a Standard Dividend of 7 per cent. per annum, subject to the Sliding-Scale.

Minimum Price, £16 per Share.

Tenders must be sent in not later than Eleven a.m., Friday, the 28th of July, 1899.

Particulars, Conditions, and Form of Tender obtainable on application to W. F. VERRALL, Secretary to the Company, 55, Chapel Road, WORTHING.

BOROUGH OF ROCHDALE.

TO CHEMICAL MANUFACTURERS.

THE Gas Committee of the Corporation invite TENDERS for the supply of such quantities of BROWN OIL OF VITRIOL as they may require during the ensuing Twelve Months. The Acid to be made from Pyrites or recovered Sulphur, and to be delivered at the Rochdale Railway Station.

Further Information can be obtained from Mr. T. Banbury Ball, the Manager at the Gas-Works.

Tenders, endorsed "Vitriol," must be sent to me not ater than noon of Wednesday, the 19th inst.

By order,
JAMES LEACH,
Town Clerk.

Town Hall, Rochdale,
July 7, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

"A most useful Book of Reference, which no Water-Works Engineer should be without."

Notes on Water Supply

Containing References, Tables, Notes, Memoranda, and Detailed Advertisements in Relation to Water-Works Engineering; also Illustrated Description and Prices of Apparatus, Appliances, Tools, and Material required on a Water-Works.

By J. T. RODDA,

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Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

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BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton	10,500 Cubic Feet.
Illuminating Power	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

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GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Present Daily Produce available 3000 Tons.

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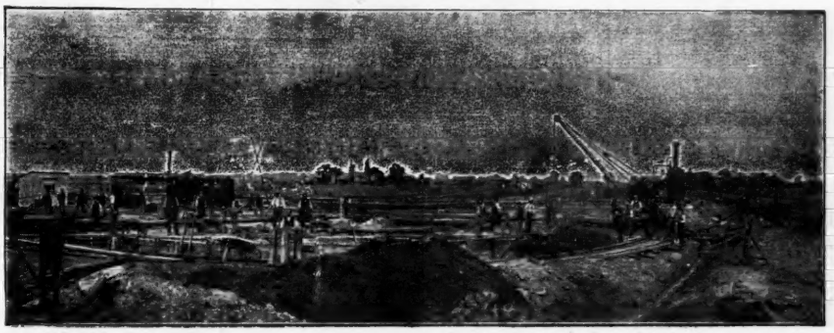

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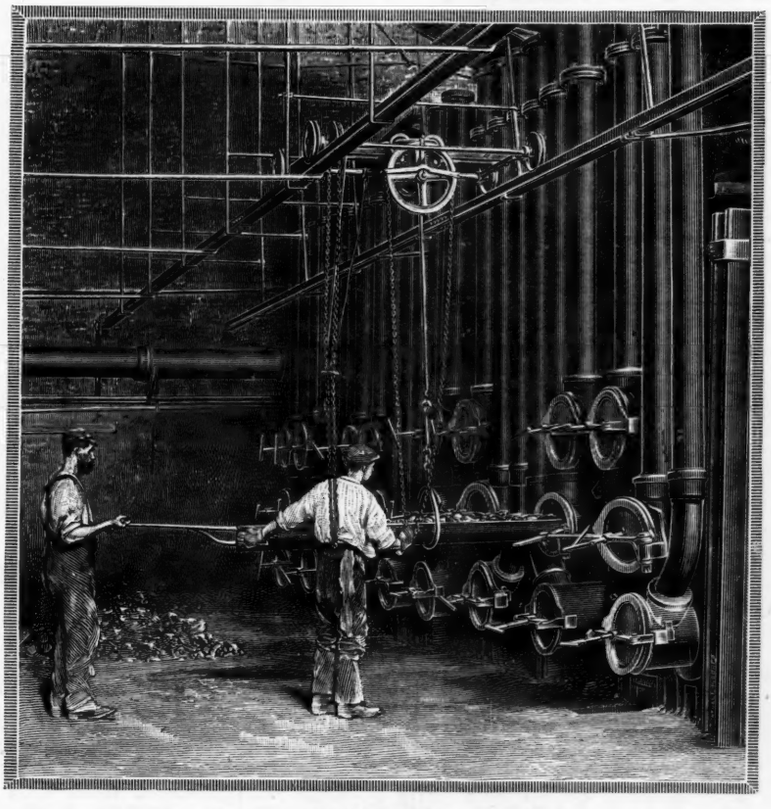

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Yield of Gas per ton	10,500 cub. ft.
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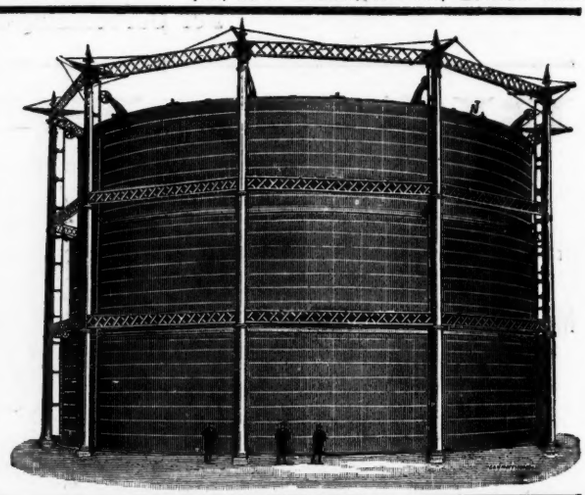

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Gas Engineers who are considering the introduction of Inclined Retorts and Coal Handling Machinery would do well to get permission of B. W. Smith, Esq., to inspect the installation of

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which we have completed for the Urban District Council of Smethwick, and of which the Chairman of the Gas Committee, John Stones, Esq., says that they "are a GREAT CREDIT to all concerned, and MOST SATISFACTORY" to himself. We manufactured the whole of the Ironwork and Machinery, except the Gas-Engine,

AT

our own Works, and the Settings also are of our own special design. Go to

SMETHWICK

and judge for yourselves as to the substantiality of the design, the excellence of the workmanship, the successful working and the beautifully even heats. No creeping of Coal in the Retorts, nor any abominable probing and tickling take place. Note the Measuring-Chambers and the Charging-Shoots, which

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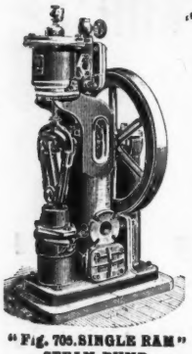


"Fig. 705. SINGLE RAM" STEAM-PUMP.

Fig. 592. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

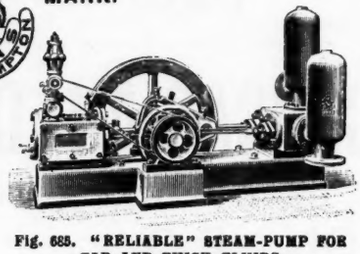
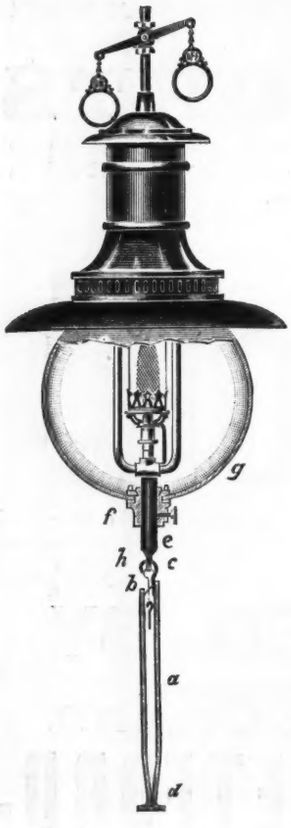


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

THE "VERITAS" ARC LAMPS



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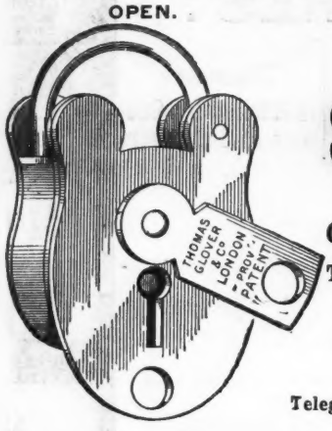

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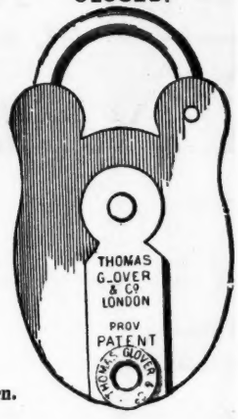

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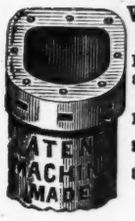

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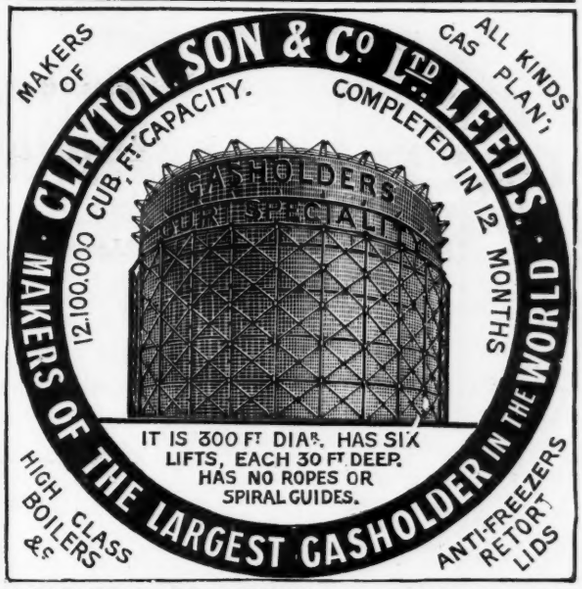
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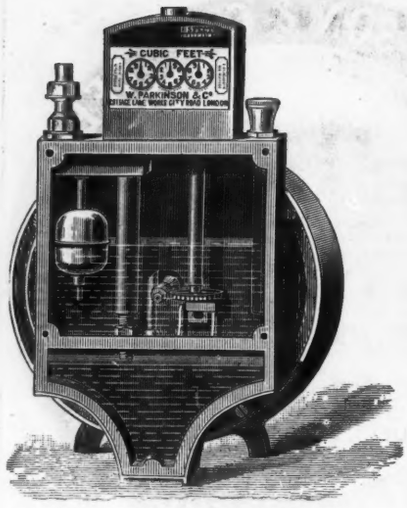

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[See also Advt. p. 98.

LONDON: Printed by WALTER KING (at the Office of King, Sell, & Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 11, 1899.